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THIRD BIENNIAL REPORT

OF THE

NORTH CAROLINA BOARD OF HEALTH

FOR THE YEARS

1889 and 1890.

1889-90

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THIRD BIENNIAL REPORT

OF THE

NORTH CAROLINA

BOARD OF HEALTH,

1889-1890.

RALEIGH, N. C.:
JOSEPHUS DANIELS, STATE PRINTER AND BINDER.
Presses of Edwards & Broughton.
1891.

28971

MEMBERS OF THE BOARD.

H. T. BAHNSON, M. D., President------------------Salem.
Term Expires 1893.

THOMAS F. WOOD, M. D., Sec. and Treasurer-----Wilmington.
Term Expires 1891.

RICHARD H. LEWIS, M. D----------------------Raleigh.
Term Expires 1893.

W. D. HILLIARD, M. D---------------------------Asheville.
Term Expires 1891.

J. A. HODGES, M. D-----------------------------Fayetteville.
Term Expires 1895.

J. M. BAKER, M. D------------------------------Tarboro.
Term Expires 1895.

APPOINTMENTS BY THE GOVERNOR, TERMS EXPIRING 1891.

J. L. LUDLOW, C. E -----------------------------Winston.
F. P. VENABLE, PH. D., F. C. S-----------------Chapel Hill.
J. H. TUCKER, M. D-----------------------------Henderson.

STANDING COMMITTEES.

EPIDEMICS—Drs. Wood and Hodges.

WATER SUPPLY AND DRAINAGE—Drs. Bahnson and Ludlow.

HYGIENICS OF PUBLIC SCHOOLS—Drs. Hilliard and Hodges.

CLIMATOLOGY—Dr. J. H. Tucker.

ADULTERATION OF FOODS AND MEDICINES—Prof. F. P. Venable.

SANITARY CONDITION OF STATE INSTITUTIONS—Drs. Lewis and Baker

VITAL STATISTICS—Drs. Wood, Lewis and Bahnson.

LIST OF SUPERINTENDENTS OF HEALTH IN THE STATE OF NORTH CAROLINA DECEMBER 31ST, 1890.

Alamance—Dr. G. W. Long, Graham.
Anson—Dr. E. F. Ashe, Wadesboro.
Beaufort—Dr. W. A. Blount, Washington.
Bladen—Dr. Newton Robinson, Elizabethtown.
Buncombe—Dr. H. B. Weaver, Asheville.
Burke—Dr. J. L. Laxton, Morganton.
Cabarrus—Dr. R. S. Young, Concord.
Caldwell—Dr. A A. Kent, Lenoir.
Carteret—Dr. M. F. Arendell, Morehead City.
Caswell—Dr. R. H. Williamson, Yanceyville.
Catawba—Dr. J. M. McCorkle, Newton.
Chatham—Dr. H. T. Chapin, Pittsboro.
Cherokee—Dr. J. F. Abernathy, Murphy.
Chowan—Dr. R. H. Winborne, Barnitz.
Cleveland—Dr. O. P. Gardner, Shelby.
Columbus—Dr. Isaac Jackson, Whiteville.
Craven—Dr. Leinster Duffy, Newbern.
Cumberland—J. A. Hodges, Fayetteville. (Succeeded by Dr. J. H. Marsh.)
Davidson—Dr. R. L. Payne, Jr., Lexington.
Duplin—Dr. Jas. W. Blount, Kenansville.
Durham—Dr. N. M. Johnson, Durham.
Edgecombe—Dr. J. M. Baker, Tarboro. (Succeeded by Dr. Donald Williams.)
Forsyth—Dr. D. L. Dalton, Winston.
Franklin—Dr. E. S. Foster, Louisburg.
Gaston—Dr. E. B. Holland, Dallas.
Granville—Dr. J. M. Hays, Oxford.
Greene—Dr. E. H. Sugg, Snow Hill.
Guilford—Dr. E. R. Michaux, Greensboro.
Halifax—Dr. A. B. Pierce, Weldon.
Haywood—Dr. R. L. Allen, Waynesville.
Henderson—Dr. W. B. Reese, Hendersonville.
Iredell—Dr. M. W. Hill, Statesville.
Johnston—Dr. L. L. Sasser, Smithfield.
Jones—Dr. C. B. Woodley, Trenton.
Lincoln—Dr. W. L. Crouse, Lincolnton.
Macon—Dr. J. M. Lyle, Franklin.
Madison—Dr. J. K. Hardwicke, Marshall.
Martin—Dr. W. H. Harrell, Williamston.
McDowell—Dr. J. H. Gilkey, Marion.
Mitchell—Dr. W. P. Upton, Bakersville. (Succeeded by Dr. W. E. Smith.)

Moore—Dr. Gilbert McLeod, Carthage.
New Hanover—Dr. F. W. Potter, Wilmington.
Northampton—Dr. H. W. Lewis, Jackson.
Orange—Dr. D. C. Parris, Hillsboro.
Pender—Dr. S. S. Satchwell, Burgaw.
Pitt—Dr. B. T. Cox, Redalia.
Polk—Dr. Henry Shankle, Mills' Springs.
Randolph—Dr. J. W. Long, Randleman.
Richmond—Dr. J. M. Covington, Rockingham.
Robeson—Dr. R. F. Lewis, Lumberton.
Rowan—Dr. J. J. Summerell, Salisbury.
Rutherford—Dr. W. Thompson, Cliffdale.
Sampson—Dr. J. A. Stevens, Clinton.
Stokes—Dr. W. V. McCauless, Danbury.
Tyrrell—Dr. Ab. Alexander, Columbia.
Union—Dr. W. C. Ramsay, Monroe.
Vance—Dr. A. Cheatham, Henderson.
Wake—Dr. Jas. McKee, Raleigh.
Warren—Dr. P. J. Macon, Warrenton.
Watauga—Dr. W. B. Councill, Boone.
Wayne—Dr. W. H. Cobb, Jr., Goldsboro.
Wilson—Dr. R. W. King, Wilson. (Succeeded by Dr. Albert Anderson.)
Yadkin—Dr. T. R. Harding, Yadkinville.
Yancey—Dr. J. L. Ray, Burnsville.

LIST OF VOLUNTARY REPORTERS FROM COUNTIES HAVING NO BOARD OF HEALTH DECEMBER 31ST, 1890.

Alleghany—Dr. Geo. Doughton, Sparta.
Bertie—Dr. H. V. Dunston, Windsor.
Brunswick—Dr. D. B. McNeill, Supply.
Camden—Dr. E. B. Ferebee, Belcross.
Currituck—Dr. F. W. Ritter, Moyock.
Hyde—Dr. Ed. Clark, Middleton.
Jackson—Dr. J. M. Candler, Dillsboro.
Montgomery—Dr. W. A. Simmons, Troy.
Nash—Dr. G. W. Lewis, Stanhope.
Onslow—Dr. J. L. Nicholson, Richlands.
Rockingham—Dr. T. E. Balsley, Reidsville.
Stanly—Dr. R. Anderson, Albemarle.
Swain—Dr. E. M. Scruggs, Bryson City.
Washington—Dr. W. H. Ward, Plymouth.

NORTH CAROLINA BOARD OF HEALTH,
Secretary's Office,
WILMINGTON, January 3d, 1891.

His Excellency DANIEL G. FOWLE,
Governor of North Carolina.

SIR: In accordance with section 2 of the "Act Relating to the Board of Health," I have the honor to present this the Third Biennial Report of the North Carolina Board of Health, under the amended law, ratified by the General Assembly on the 9th March, 1885.

THOMAS F. WOOD, M. D.,
Secretary and Treasurer.

THIRD BIENNIAL REPORT

OF THE

North Carolina Board of Health.

1889–1890.

SYNOPSIS OF THE WORK DONE BY THE NORTH CAROLINA BOARD OF HEALTH FOR THE TWO YEARS ENDING DECEMBER, 1890.

At the date of our last report, Southern Boards of Health were turning with seriousness to the adoption of means for the prevention of yellow fever, and active steps were taken by the executive officers of these bodies, under the leadership of Jerome Cochrane, M. D., State Health Officer for Alabama. Jacksonville had taken the initiative in the movement, but after it was known that the General Assembly of Alabama had passed a joint resolution inviting the States of Texas, Florida, Louisiana, Mississippi, South Carolina, North Carolina, Georgia, Tennessee, Kentucky and Illinois to appoint delegates to a Quarantine Conference to be held in the city of Montgomery, all the States interested consented to the Montgomery Conference, which accordingly convened in that city on the 5th March, 1889.

Delegates from the State of North Carolina were appointed by Governor Fowle, the following members being present at the Conference:

Dr. Thomas F. Wood, Wilmington; Dr. R. F. Gray, Winston; Dr. T. A. Allen, Hendersonville; Dr. J. F. Harrell, Whiteville; Mr. J. L. Ludlow, C. E., Winston; Mr. Joseph E. Robinson, Goldsboro; Mr. James Norfleet, Henderson.

In the Conference Alabama was represented by ten members, Florida by ten, Georgia by thirteen, Illinois by three, Kentucky by four, Louisiana by six, North Carolina by seven, Mississippi by five, South Carolina by two, Tennessee by four, Texas by two, as follows:

ALABAMA—Mr. Theodore Welch, General Transportation Agent L. & N. R. R., Montgomery; Mr. B. C. Epperson, Superintendent M. & M. R. R., Montgomery; Colonel W. S. Reese, Mayor, Montgomery; Dr. Jerome Cochrane, Montgomery; Dr. S. D. Seelye, member State Board of Health, Montgomery; Dr. J. S. Weatherly, member State Board of Health, Montgomery; Dr. T. A. Means, Secretary State Board of Health, Montgomery; Colonel J. C. Clarke, Vice President M. & O. R. R., Mobile; Dr. C. H. Franklin, member State Board of Health, Union Springs; Dr. W. H. H. Hutton, U. S. M. H. S., Mobile.

FLORIDA—Dr. Richard P. Daniel, Jacksonville; Dr. J. T. Porter, Key West; Dr. J. D. Palmer, Fernandina; Dr. J. P. Wall, Tampa; Dr. W. H. Ross, Pensacola; Dr. T. J. Williamson, ----------; Mr. Joseph Voyle, Gainesville; Mr. J. E. Ingraham, Sanford; Mr. Wm. B. Henderson, Tampa; Mr. W. K. Hyer, Pensacola.

GEORGIA—Dr. J. B. S. Holmes, Rome; Dr. S. C. Benedict, Athens; Dr. James B. Baird, Atlanta; Dr. W. D. Bizzell, Atlanta; Dr. J. McF. Gaston, Atlanta; Dr. E. Berkeley, Atlanta; Dr. J. A. Dunwoody, Brunswick; Dr. W. B. Burroughs, Brunswick; Dr. Eugene Foster, Augusta; Dr. J. C. L. Hardy, Savannah; Dr. E. G. Ferguson, Macon; Mr. E. T. Charlton, Savannah.

ILLINOIS—Dr. John H. Rauch, Secretary State Board of Health; Dr. B. F. Griffith, Dr. R. E. Starkweather.

KENTUCKY—Dr. J. N. McCormick, Secretary State Board of Health; Dr. P. Thompson, President State Board of Health; Dr. Wm. Bailey, member State Board of Health; Dr. J. O. McReynolds.

LOUISIANA—Mr. B. R. Freeman, New Orleans; Dr. J. W. Dupree, Baton Rouge; Dr. C. M. Smith, Franklin; Dr. Robert Layton, Monroe; Dr. G. W. Austin, New Orleans; Dr. Clement P. Wilkinson, President State Board of Health.

MISSISSIPPI—Dr. J. M. Taylor, Corinth; Dr. R. S. Toombs, Greenville; Dr. G. W. Trimble, Grenada; Dr. W. F. Hyer, Meridian; Dr. O. R. Early, Columbus.

SOUTH CAROLINA—Dr. T. Grange Simons, Charleston; Dr. H. B. Horlbeck.

TENNESSEE—Dr. J. D. Plunket, President State Board of Health; Dr. G. B. Thornton, Memphis; Dr. John E. Black, President Memphis Board of Health; Hon. R. P. Haddon, Memphis.

TEXAS—Dr. Robert Rutherford, State Health Officer; Dr. L. A. Pires.

VISITING GUESTS.

Dr. John B. Hamilton, U. S. M. H. S., Surgeon General Marine Hospital Service; Dr. Victor M. Vaughn, Michigan; Dr. George M. Sternberg, U. S. A., Baltimore, Maryland; Dr. D. M. Burgess, U. S. Sanitary Inspector, Havana; Dr. T. C. VanBibber, Baltimore, Maryland.

The following recommendation for permanent officers was made:

FOR PRESIDENT—Dr. C. P. Wilkinson, Louisiana.

FOR VICE-PRESIDENTS—Hon. David P. Haddon, Tennessee; Dr. T. Grange Simons, South Carolina; Mr. E. Berkeley, Georgia; Dr. William Bailey, Kentucky; Mr. J. C. Clark, Alabama; Dr. Robert Rutherford, Texas; Dr. J. Y. Porter, Florida; Dr. R. F. Gray, North Carolina; Dr. B. M. Griffith, Illinois; Dr. J. M. Taylor, Mississippi.

SECRETARIES—Dr. J. N. McCormick, Kentucky; Mr. J. L. Ludlow C. E., North Carolina; Dr. J. B. Baird, Georgia.

It will be seen by the *personnel* of the Convention that all the professions and corporations were represented that came into practical contact with the management of the epidemic; that railroad officials, upon whom devolved so many and such difficult duties in connection with the transportation of the sick and of supplies to the quarantined sections, as well as the policing of the trains; quarantine officers, who had had long experience in the so-called yellow fever belt; civil and sanitary engineers, by whose judgment systems of sewerage had been constructed; chemists and bacteriologists, who had studied the minuter items of causation, all including men who had had practical experience in dealing with the scourge of yellow fever, thus making this body one of great practicality.

It is only necessary to give the practical results of this Conference as they were formulated after a deliberate interchange of views.

VIEWS FORMULATED ON THE MANAGEMENT OF AN EPIDEMIC.

SECTION 1. During the prevalence of yellow fever epidemics passengers and freights should be brought from infected localities only under such regulations and restrictions as may be established by the State health authorities along the lines of the roads concerned.

(2) The regulations and restrictions governing railroad transportation during yellow fever epidemics should be of such a character as to afford all reasonable guarantees to the communities in danger of invasion by the disease, but should not be more onerous than the circumstances warrant, and should be framed with due consideration of the extent and character of the danger in each particular case, and as affected by latitude and seasons of the year and other qualifying conditions.

(3) At all seasons of the year, and under all circumstances, the simple passage of railroad trains should be allowed without obstruction, even when carrying sick refugees from infected places to healthy localities willing to receive them.

SEC. 2. A well digested quarantine formula, making and promulgating the necessary rules and regulations for enforcing the same, should be prepared, ready to be put in force when necessary to do so, at all points where it is necessary to put quarantine in force. These rules should be published for general information, to enable all persons to comply with the same, and displayed by placard in every depot.

SEC. 3. At quarantine stations accommodations should be provided for caring for such persons, if any, as may be detained or are not permitted to pass through such stations while in transit until they can be disposed of.

SEC. 4. Only competent physicians, who have had experience with contagious and infectious diseases, should be made inspectors at quarantine stations, whose duty it shall be to inspect and examine the condition of passengers, baggage and express matter. All inspectors should have the power to administer oaths, and to remove from the trains and detain at quarantine stations such passengers, baggage or express matter, etc., as may be found necessary to prevent the introduction or spread of infectious or contagious diseases of any kind.

SEC. 5. State boards of health should be the powers authorized to put quarantine in force. They should determine when, where and for what length of time quarantines should be maintained; provide the means necessary for enforcing the same, and promulgate rules and regulations for conducting quarantines. Presidents and secretaries of State boards should be required to visit and inspect all quarantine stations as often as practicable during the existence of such quarantines, and to make public, over their signatures and official positions, the general condition of the public health at the points where quarantines are established, and the localities affected by such quarantines. Local health officers, municipal or county authorities may establish quarantine regulations, conferring with the State board, if deemed necessary, for co-operation. The regulations for governing local quarantines should not be in conflict with the rules and regulations adopted by the State boards of health for enforcing quarantine regulations.

SEC. 6. The refuge stations as at present operated on the sea-coast of the United States are, in the opinion of this body, of infinite service, and we would recommend their continuance in a full equipment for all requirements.

SEC. 7. When any suspicious case occurs, the nature of which has not or cannot be determined at its then present stage, or doubts arise as to the nature of the case, wise precaution demands that such case be immediately isolated from contact with all other persons until medical science has diagnosticated the case and is able to determine the nature of it beyond doubt. When conclusions are reached they should be made public.

SEC. 8. Experience has proven that, by proper precautions, closed cars bearing passengers or freight may be run through infected localities without danger of infection.

SEC. 9. Railroad agents on roads under quarantine surveillance at way stations should be required to refuse to sell tickets to any persons who cannot show that they have not in twelve days been exposed to any source of infection, and conductors should be required by law to refuse to transport passengers from way stations who are not supplied with tickets.

SEC. 10. Health certificates should be required from all persons whenever yellow fever prevails in this country. They should be issued only by the health official in charge of the place, under official seal, or, in the absence of such seal, under the seal of the municipal or county court where the certificate originates. In each certificate the person to whom it is issued should be so described as to admit of his identification, and should state the facts of the case fully and circumstantially. And to such certificates full credence should be given by all health authorities. We must have honesty and mutual confidence amongst those charged with the protection of the public health. A uniform system of certificates should be adopted by boards of health. We would recommend the following form :

------------------------------(Office of the Board of Health.)
------------------------------(Date.)

HEALTH CERTIFICATE.

Name ------------------------------
Residence ------------------------------
How long in ------------------------------
Destination ------------------------------

Have you or your baggage been exposed to yellow-fever infection within the past thirty days ? ------------------------------

I solemnly swear that the answer to the above question is true, so help me God.

[Seal.] (Signed) ------------------------------
(Name of applicant.)

(Signed) ------------------------------(Official.)

The following resolution was appended to the above as an expression of opinion as to the best method of quarantine practice:

Resolved, That this Conference indorse the Holt quarantine and disinfection system as at present operated at New Orleans, La., as the best one known for the prevention of the introduction of yellow fever into the ports of the United States, and recommend its uniform adoption.

[NOTE.—The Holt system, as referred to above, has been adopted at the refuge quarantine stations under the management of the United States Marine Hospital Service, by direction af Surgeon General John B. Hamilton, and quite recently a station with the improvements, which practice has suggested, has been erected at the port of Charleston, S. C., an account of which is given further on.]

WHAT SHALL BE DONE ON THE OCCURRENCE OF YELLOW FEVER; WHAT IMMEDIATE MEASURES OF ISOLATION ARE DESIRABLE? was answered in a series of resolutions offered by Dr. Jerome Cochrane, and were adopted as the sense of the Conference:

Resolved, *1st*. When one case, or a few cases, of yellow fever occur in any community, it does not follow of necessity that the disease must spread and become epidemic. On the contrary, the experience of many countries through long periods of time shows conclusively that in the majority of such instances, and without the observance of any special means of prophylaxis, the disease fails to spread.

2d. When one case, or a few cases, of yellow fever occur in any community, in the light of our present knowledge of the habits and modes of propagation of the disease, it is generally possible, by the employment of the proper prophylactic measures, to prevent the development of an epidemic.

3d. The golden rule for the prevention of yellow fever is non-intercourse—isolation—the keeping of the well away from the sick, away from infected things, and very especially away from infected localities.

4th. In the enforcement of this golden rule of non-intercourse, two problems present themselves for solution. (*a*) To keep the people generally from coming into the infected houses and the infected localities; and (*b*) to keep doctors and nurses and other attendants, and the well members of sick families, from visiting and mingling with people outside of the infected houses and localities. The solution of the first of these problems is comparatively easy. The solution of the second is sufficiently difficult. But it is possible to solve them both.

5th. In the densely settled sections of cities guards may be useful for the enforcement of non-intercourse. They are much less needed in sparsely settled towns. In villages and country neighborhoods, as a rule, they are not needed at all. In all cases every intelligent family should be able to take care of itself—should be able to keep all of its members away from infected houses and localities, and to guard its own premises from invasion by dangerous persons and things.

6th. Non-intercourse may be practiced in the very centre of an infected district with considerable probability of escaping the fever. Cloistered convents and prisons in infected cities, with yellow fever raging all around them, usually escape invasion ; and there are numerous instances on record in which private families in the midst of epidemics have passed the ordeal safely by the vigorous enforcement of non-intercourse.

The following resolution was adopted as the sense of the Conference on

THE MEANS OF DISINFECTION WHICH SHOULD BE ADOPTED FOR CHAMBERS AND DWELLINGS WHERE CASES OF YELLOW FEVER HAVE OCCURRED.

Resolved, That this Conference recommend that all approved methods of disinfection by means of personal and municipal cleanliness, by ventilation, fumigation, chemical affusion, destruction by fire of all infected or suspected things used during an epidemic of yellow fever and until the danger of its spread shall have passed, and that all fomites should be disinfected after the recovery of the sick.

We recommend as a basis of disinfection the processes as set forth by the Committee on Disinfectants of the American Public Health Association.

DISINFECTION OF PERSONAL BAGGAGE.

Resolved, That the best form of disinfection for personal baggage is moist heat.

The following rules for

RAILROAD QUARANTINE

were laid down:

RULES PREPARED BY THE COMMITTEE ON RAILROAD QUARANTINE.

1. Quarantine should not be made against any place until it is officially known that yellow fever or other infectious or contagious disease exists at such place.

2. Only competent physicians should be put in charge of quarantine stations, and only thoroughly qualified persons should be employed as inspectors on railway trains.

3. Quarantine stations located on railroads should be established at convenient points, on one or both sides of a town or station, as may be deemed necessary.

4. If an epidemic of yellow fever or other infectious or contagious disease exist at a town or station, trains carrying passengers or freights should be required to pass through the limits of such towns or stations at a speed of not less than ten (10) miles per hour, without stopping at such towns or stations, but should stop at the quarantine station.

5. Passengers to or from such infected point should only be received or delivered at the quarantine station, under the supervision of the quarantine officer in charge of the station.

6. Railway tickets may be sold to persons leaving an infected place to any point willing to receive them.

7. All baggage from any infected point should be properly disinfected.

8. As far as practicable the same rules proposed for railroads should be applied to vessels of every kind, stage coaches, or other means of travel.

9. The passage of railroad trains through any point on the line of road, whether infected or not, should not be prohibited by any quarantine regulations. The conductors of passenger trains should close the windows and ventilators and lock the doors of cars passing through any place where a train is not permitted to stop.

10. All freight to any infected place should be delivered either at the quarantine station or the nearest railway station to such infected point, where it can be properly cared for.

11. All mail matter from any infected place should be properly disinfected by the United States Government. And mail matter intended for infected points should be put off the trains at the quarantine stations. The United States Government should instruct postmasters to receive and deliver mails at such quarantine stations.

12. Railroads and express companies may receive for transportation from any infected place, during the time such infection exists, any merchandise or traffic consigned to places willing to receive it.

13. State authorities should employ competent persons on passenger trains as inspectors of passengers, baggage and express matter as additional precaution, but the fact of inspectors being on such trains should not relieve trains carrying passengers, or express matter or baggage

from stopping at quarantine stations for such inspection as the officer in charge may determine to be necessary.

14. It is recommended that all quarantines, as far as practicable, should be uniform in their requirements and operations, which will greatly contribute to the prevention of panics and tend to allay unnecessary excitement and fear on the part of the people.

15. The form of health certificate adopted by the Quarantine Convention held at Montgomery March 5, 1889, should be prepared for health officers to issue to such persons as may be found entitled to receive the same. A copy of this certificate should be printed with these rules and conspicuously posted at railway stations.

16. It is the desire and intention of health authorities, as far as practicable, to throw every safeguard around the public health of all localities. Muncipal, county and State authorities are expected to co-operate in every possible way with health officers located in towns, villages and cities, and in charge of quarantine stations, to enable them to prevent the introduction or spread of yellow fever or other infectious or contagious diseases.

As a complement to the above rules and suggestions, the Conference adopted the plan of INTERSTATE NOTIFICATION, as formulated by the Conference of State Boards of Health at a meeting in Toronto, October 6th, 1886, with slight modifications.

INTERSTATE NOTIFICATION OF INFECTIOUS OR CONTAGIOUS DISEASES.

WHEREAS, It is necessary for the protection and preservation of the public health that prompt information should be given of the existence of cholera, yellow fever or small-pox ; be it

Resolved 1. That it is the sense of the National Conference of State Boards of Health, that it is the duty of each State and Provincial Board of Health within whose jurisdiction any of said diseases may occur, to furnish immediate information of the existence of such disease to boards of health of neighboring States and Provinces, and to local boards in such States as have no central board, in which the duty of notification shall lie upon the local boards.

2. That upon the prevalence of rumor of the existence of pestilential disease in any State or Province, if positive, definite information thereon be not obtainable from the proper health authorities, this Conference holds that the health officials of another State are justified in entering the before-mentioned State or Province for the purpose of investigating and establishing the truth or falsity of such reports.

3. That whenever practicable, the investigations undertaken under the preceding section shall be made with the co-operation of the State or local health authorities.

4. That any case which presents symptoms leading to serious suspicion of the existence of one of the aforenamed diseases, shall be treated as suspicious, and reported as provided for in cases in which the diagnosis is certain.

5. That any case respecting which reputable and experienced physicians disagree as to whether the disease is or is not pestilential, shall be reported as suspicious.

6. That any suspected case respecting which efforts are made to conceal its existence, full history, and true nature, shall be deemed suspicious and so reported.

7. That in accordance with the provisions of the foregoing resolutions, the Boards of Health of the United States and Canada, represented at this conference, do pledge themselves to an interchange of information as herein provided.

The following resolutions, explanatory of the above, were adopted by the International Conference of State Boards of Health, at Washington, September 8, 1887:

Resolved, That the conference re-affirms the principles contained in the resolutions adopted by it at its meeting in Toronto in 1886.

2d. That the communicable diseases hereinafter mentioned, prevalent in certain areas, or which tend to spread along certain lines of travel, be reported to all State and provincial boards within said area or along said line of communication.

3d. That in the instance of small-pox, cholera, yellow fever and typhoid fever reports be at once forwarded, either by mail or telegraph, as the urgency of the case may demand; and, further, that in the instance of diphtheria, scarlatina, typhoid fever, anthrax or glanders, weekly reports, when possible, be supplied, in which shall be indicated, as far as known, the places implicated, and the degree of prevalence.

Such was the substantial result of the Quarantine Convention, which the delegation from the State at large, and from the North Carolina Board of Health especially, deem of importance to record. The Conference was remarkably earnest, and the very smallest time was devoted to discussing theories. Indeed, marked impatience was manifested in the presentation of papers which were ordinarily of more than general interest.

SANITARY ASSOCIATION ORGANIZED.

As an index of the importance attached to sanitary matters in the State, a call was made for a Sanitary Convention, under the auspices of the North Carolina Board of Health, which was responded to by gentlemen from various portions of the State.

CALL FOR A SANITARY CONVENTION TO BE HELD IN RALEIGH FEBRUARY 6TH, 1889.

The interests appertaining to the public health are of such increasing importance that its demands can no longer go unheeded by the general public. The time has come when men of all professions, who have given the subjects of public and private sanitation any consideration, should assemble to interchange views, and begin in earnest the study of the living questions which concern healthy homes and healthy towns.

1. Many towns in the State have reached a condition of progress which have brought them face to face with the problems of sewerage and water supply, involving vast sums of money and the future health of unborn thousands.

2. Our State has numerous locations, the merits of which are attracting the attention of physicians and invalids in many States North and West, and these must be studied by us with definite purpose and concerted effort, that we may present the public with authoritative statements as to the actual condition of our unoccupied sanitaria.

3. The questions involved by the appearance now and then of pestilential diseases in States so intimately bound to us by railroad communication that their cause is our cause in a philanthropic as well as a business sense, that we must study them and discuss them in order to disarm these epidemics of their greatest dangers, and to quell the panics that do more harm, if possible, than the pestilence.

4. The interests of the public health of the State, while of necessity, at this stage of its development, intrusted to the medical profession, must be dependent for its vitality upon the interest the general public

takes in it, for it is the cause of the people. A convention, therefore, of the representatives of the people, officials cognizant of the defects of the sanitation of our houses and towns and institutions, and private citizens who have been studying with interest, and practicing with all the lights they have, the minutiæ of health laws, is a potent way of disseminating information and of studying our defects and the ways to remedy them.

For these and many other considerations, we, the undersigned, deem it appropriate to call a Sanitary Convention, to meet in Raleigh on Wednesday, the 6th day of February, 1889, asking that a good attendance may be had of county superintendents of health and other officials intrusted with the supervision of the public health, and of farmers, lawyers, doctors, ministers, civil and mining engineers, mayors of towns, chairmen and members of the boards of county commissioners, superintendents of asylums for the insane and indigent, officers in charge of hospitals and penitentiaries, school-teachers, railroad officials, and every citizen interested in the present and future health of our communities and homes.

After organization the following topics will be presented :

"How can we best secure economical disposal of refuse in our towns?"

"The prospects of the future water supply in our larger towns."

"Some of the facts concerning the sanitaria in our State."

"What is being done towards providing healthful school-houses in the smaller towns and the country?"

"How can we establish a Bureau of Vital Statistics, that we may put on record, for our guidance and information, the destiny of the population as regards births, diseases, deaths, and the history of epidemics dangerous to the public health?"

"Our inland and maritime quarantine."

"What is needed to sustain the efforts of the North Carolina Board of Health?"

The undersigned unite in the above call, fully appreciating the great benefits which may result to the health of the people by a full exchange of thought, and earnestly bespeak a full representation.

Hon. JOHN J. FOWLER, Mayor of Wilmington.

JULIAN M. BAKER, M. D., Superintendent of Health, Edgecombe County.

THOMAS F. WOOD, M. D., Secretary N. C. Board of Health, Wilmington.

R. N. WILLIAMS, Esq., Chairman of County Commissioners, Edgecombe County.

Hon. WILLIAM E. FOUNTAIN, Mayor of Tarboro.

GEORGE GILLETT THOMAS, M. D., Member of Quarantine Board, Cape Fear River.

W. G. CURTIS, M. D., Quarantine Physician, Southport.

J. W. JONES, M. D., President N. C. Board of Health.

H. T. BAHNSON, M. D., Salem, Member of N. C. Board of Health.

J. H. TUCKER, M. D., Henderson, Member of N. C. Board of Health.

J. L. LUDLOW, C. E., Winston, Member of N. C. Board of Health.

Hon. CHARLES BEAUFORT, Mayor of Winston.

E. B. BORDEN, Esq., Chairman of County Commissioners, Wayne County.

J. C. CHASE, C. E., Superintendent Clarendon Water-works Company, Wilmington, N. C.

Hon. J. E. PETERSON, Mayor of Goldsboro.

THOMAS HILL, M. D., Coroner of Wayne County.

Prof. F. P. VENABLE, University of North Carolina.

Prof. W. J. MARTIN, Davidson College.

Hon. E. B. NEAVE, Mayor of Salisbury.

T. J. SUMNER, Esq., Chairman of County Commissioners, Rowan County.

J. J. SUMMERELL, M. D., Superintendent of Health, Rowan County.

W. T. ENNETT, M. D., Superintendent of Health, Pender County, and President N. C. Medical Society.

H. B. BATTLE, Ph. D., Director N. C. Agricultural Experiment Station, Raleigh.

JOHN MCDONALD, M. D., Member N. C. Board of Health.

Hon. A. A. THOMPSON, Mayor of Raleigh.

RICHARD H. LEWIS, M. D., Member N. C. Board of Health.

JAMES MCKEE, M. D., Superintendent of Health, Wake County.

W. P. BEALL, M. D., Greensboro.

Prof. W. G. SIMMMONS, Wake Forest.

FLETCHER R. HARRISS, M. D., Superintendent Health, Vance County.

W. G. FREEMAN, M. D., Murfreesboro.

Hon. THOS. W. GOODRICH, Mayor of Henderson.

And many others.

Although not a large assemblage, it represented many counties and cities, nearly every prominent institution of learning, and gave a larger interest to the problems of sanitation than ever before in this State; and the paper contributed on "*The Public Water Supply of Towns and Cities in North Carolina*," by Dr. H. T. Bahnson, of Salem; another on "*Inland Quarantine*," by Dr. George G. Thomas, of Wilmington; another on "*Maritime Quar-*

antine," by Dr. W. G. Curtis, of Southport; another on "*The Necessity of State Intervention to Prevent the Adulteration of Food*," by Prof. F. P. Venable, University of North Carolina; another on "*How Can We Best Secure Economical Disposal of Refuse in Our Towns?*" by Mr. J. L. Ludlow, C. E., Winston; another on "*The Duties and Responsibilities of County Superintendents of Health*," by J. H. Tucker, M. D.; another on "*Some Gains from Sanitation*," by. J. W. Jones, M. D.; another on "*The Sewerage of Cities and Towns*," by Mr. J. L. Ludlow, C. E.; another on "*How Can We Best Secure Economical Disposal of Refuse and Garbage in Our Towns?*" "*Some Remarks on Garbage Furnaces in Use*," by Thomas F. Wood, M. D., Wilmington, fairly represented the leading topics, which are pressing themselves upon the thoughtful people of the State.

OF THE MEETINGS OF THE STATE BOARD OF HEALTH.

Owing to the considerable expense attending the meetings of the Board few are held, most of the details of work being carried on by correspondence.

The first meeting of the biennium was held in Raleigh, at the time and place of meeting of the North Carolina Sanitary Association.

His Excellency the Governor of North Carolina made the following appointments:

Dr. J. H. Tucker, of Henderson; Mr. J. L. Ludlow, C. E., of Winston; Prof. F. P. Venable, Ph. D., F. C. S., University of North Carolina, each to serve two years.

A second meeting of the year 1889 was held at the time and place of meeting of the Thirty-Sixth Annual Session of the Medical Society of North Carolina, at Elizabeth City, on 16th to 18th days of April. According to the custom, the Medical Society of the State gives one session to a conjoint conference with the State Board of Health. As the latter proceeds from the former, with the exception of the three appointees of the Governor of the State, these bodies have a community of interest, and act as mutual auxiliaries. The following notes give a synopsis of the proceedings of this session:

CONJOINT SESSION WITH THE NORTH CAROLINA BOARD OF HEALTH.

The Medical Society of North Carolina and the State Board of Health went into conjoint session.

Dr. J. W. Jones, President of the Board of Health, presided.

Owing to the disastrous storm, which washed out the railroads leading into Elizabeth City, only two members of the Board succeeded in reaching the place of meeting before the interruption of travel. Present, Dr. J. W. Jones, President of the Board of Health, and Dr. Thomas F. Wood, Secretary. Subsequently, Dr. Richard H. Lewis and Dr. Henry T. Bahnson arrived, but too late for the meeting, by reason of the unprecedented rain storm. The conjoint meeting was called to order at 3:30 o'clock, Dr. Jones, President of the Board, in the Chair.

The Secretary of the Board recited the work which had been carried on during the last year, as set forth in the second Biennial Report published by the General Assembly. Owing to delays of transportation the reports which had been forwarded from the Secretary's office had not been received for distribution.

The most important matter now before the Board was the preparation against an expected recurrence of yellow fever in Florida.

Two members of the Board, Mr. J. L. Ludlow and the Secretary, attended the Quarantine Conference at Montgomery, Alabama, in March. The meeting was an exceedingly practical one. The question formulated for consideration was, "What would we do?" in such and such a case, showing decided impatience with theories.

We believe that firm adherence to, and a prompt execution of, the propositions agreed to, will be the working basis of the management of epidemics for the coming season. The determination to *report promptly the first cases of yellow fever*, so that each Board of Health in the country would be apprised of the earliest danger, was made a prominent feature, and if adhered to, as I believe it will be, we may expect to be able to allay panic, which was so harmful to business last fall.

The State Board have determined to keep in operation the resolution of last year, viz.: not to allow the colonization of refugees from towns infected with yellow fever, until arrangements could be made to maintain a strict quarantine guard during the period of detention.

Necessary preparations are being made to maintain a station of observation on the west side of the Cape Fear River should yellow fever show itself in the South, and the railroad authorities of the Atlantic Coast Line have given every assurance of hearty co-operation. With the small means at the command of the Board no quarantine worth mentioning could be kept up but with the assistance of railroad authorities, and they have made the inland quarantine a common cause with the Board, thereby assuring the least detention to travel and as little discomfort as possible.

I report, with regret, that the last General Assembly refused to appropriate $5,000 asked to make the Cape Fear river quarantine effective. This throws a great burden upon the Quarantine Board, and puts a large burden upon commerce in the way of delays and extra expenses in loading at a distance of twenty-five miles from Wilmington. With the small concessions made by the General Assembly of fees and the sale of a small tract of land, the Board will have to struggle to maintain an acceptable maritime quarantine. Such parsimonious treatment of the public interests is but one of a long list of barren legislative action which keeps our State behind in the race of progress.

The Secretary suggested that, in order to determine the present status of County Boards of Health and ascertain their difficulties, that he would call upon each county to hear verbal reports.

The Conference assumed a conversational enquiry. The facts elicited are about as follows:

1. In counties where there are towns of a considerable size the interest in sanitary matters is greatest and is increasing.

2. In towns and counties where the medical profession is in harmony, much influence has been used to establish sanitary work. Where the medical profession was divided no interest was manifested, and this is necessarily so, because sanitary work is a cause involving not only the entire medical profession, but the people at large, and the work of one man or two could be little felt.

3. No efforts had been made to draw the people out in sanitary meetings in the majority of counties, but it was evident that the people were awaking to the necessity of concerted action in matters appertaining to the public health.

4. Raleigh, Wilmington, Fayetteville, Charlotte, Goldsboro, Asheville and Salisbury had put forth earnest efforts to secure more accurate vital statistics, and there was no difficulty in getting active co-operation between the profession and the county authorities.

5. One of the towns reporting had been sending utterly unreliable statistics, and as a rule all had been over-estimating the population.

6. Most of the counties represented were impressed with the necessity of having a County Board of Health, and promises were made of renewed efforts to establish them.

At a subsequent session a ballot was had for the election of two members to succeed Dr. J. W. Jones, of Tarboro, and Dr. John McDonald, of Washington, which resulted in the election of Dr. J. A. Hodges, of Fayetteville, and Dr. Julian M. Baker, of Tarboro.

INSPECTION OF THE MORGANTON ASYLUM.

During the month of October two members of the Board made a tour of sanitary inspection to the Western Insane Asylum, viz.: Dr. Henry T. Bahnson and Mr. J. L. Ludlow.

During the month of August, by invitation of the Teachers' Assembly, Dr. J. A. Hodges was invited to address the Assembly.

Dr. J. W. Jones' term as a member, and as President of the Board, having expired, it became necessary to elect a presiding officer, which was done by correspondence, resulting in the election of Dr. Henry T. Bahnson, of Salem, for President.

The next general meeting of the Board took place at Oxford, 28th May. Present, Dr. H. T. Bahnson, President; Dr. J. H. Tucker, Prof. F. P. Venable, Dr. J. A. Hodges, Dr. J. M. Baker, Dr. Richard H. Lewis, Dr. Thomas F. Wood.

CONJOINT SESSION WITH THE MEDICAL SOCIETY AT OXFORD.

The conjoint session was called to order by the President, who said he had prepared no set address, but wished on behalf of the Board of Health to state a few matters of moment to the Society, and more particularly to the Board.

We come before the Society in a measure as beggars. Each member of the Society, from the fact that the Board is a creature of its making from its very infancy, must take more or less interest in the affairs of the Board. Without the co-operation of the Society, and especially the individual members, the Board of Health, according to the present legislation, is practically powerless. We are merely advisory, not executive. Our powers are limited, and our appropriations still more limited.

To properly reach the laity throughout the State, on whom our efficiency entirely depends, we must look to the Society for aid and support. He wished to speak of two points in that connection :

First. The absolute necessity of more efficient means of collecting the nature of prevalent diseases, vital statistics, etc., throughout the different counties in the State, and particularly the larger towns and cities. Many counties are entirely without Boards of Health. Many of the towns and cities of the State, from two to five, and even ten thousand population, have no system of vital statistics. It is of paramount importance in this day and time, when we are seeking the immigration of the better class of natives, inhabitants of less salubrious, less genial States, that correct ideas of the sanitary conditions of our various towns be properly tabulated and disseminated for the information of those who would come among us. To do this we must look for individuals to stir up the authorities of the towns to secure statistics, especially of deaths. There is not a physician representing any town who has not some amount of influence, and he thought they could use this to bring about this much desired reform. He asked the aid of members of the Society in collecting this greatly desired and needed information.

Second. The importance of bringing before the public the fact that we have a Board of Health, even though only advisory.

Every member of the Society is indirectly a member of the Board, and therefore the appeal comes home to each one. Throughout our State there is a tendency at present to build large private and public edifices of various kinds. The Board of Health has been applied to in relation, he was happy to say, to the building of one educational institution, to inspect and commend or condemn, as may be, the plans of that building from a sanitary standpoint. He alluded to the new Trinity College to be erected in Durham. The importance, from a financial standpoint, to the institution, of such an indorsement on the part of the Board of Health, cannot easily be calculated. The statement in the prospectus of catalogues that the plans are indorsed by a recognized body of sanitarians cannot fail to yield a most remunerative return for the little trouble that is expended in securing the services of the Board.

Another institution about to be built has likewise applied. He would urge the aid of members of the Society, so far as it lay in their power, to induce people building private residences, and more especially schools, etc., to have them built under the supervision of themselves, or that the willingness of the State Board of Health to give their services be made known to them. The idea he wished to emphasize on this occasion was to make the Board something more than a mere figurehead in the eyes of other States, and even in our own. It must be brought prominently into notice, and this is the only way we have of doing so.

Dr. O'Hagan thought the ideas of Dr. Bahnson of the highest importance to the whole State, not only from a sanitary standpoint of view, but also financially. From all portions of the United States, and especially from the North, constant inquiries are made by persons wishing to come to this section as to the healthfulness of the State. While we can boast of an excellent climate, we are, nevertheless, unable to give that accurate information that inquirers demand, and yet, by a simple act of legislation, it would be possible to meet this requirement. He thought the very first step was to have a law passed requiring the registration of marriages, births and deaths. By this means we could arrive at a pretty correct idea of the health of the State. We could also find out the preventable causes of disease and apply the proper preventive measures. He was glad to know that the Board was willing and empowered to give their aid in the proper construction of private and public buildings, but regarded the securing of some legislation of the first importance. In all countries claiming any pretentions to civilization you find these laws. In almost every State there has been an effort to obstruct all such legislation. There is no reason why that should be, and combined effort on our part would be productive of much good. He thought it would be possible to drive into the heads of those who will represent us in the next Legislature the importance of this thing. Let us call to their attention the financial benefits that would result. Remind them that the first question of an expectant immigrant is as to the health, water and sanitary precautions. The legislation will be the easier because we are not asking for money. He asks the opinions of the Secretary.

The Secretary of the Board, Dr. Thomas F. Wood, then made a report of the work and progress of the Board, the report being mainly in the form of statistical tables. He was gratified at the growth of the Board, which is now recognized by all the Boards of Health of all the States and larger cities in the Union. This is evidenced by the rapidly increasing library of the very valuable reports sent out by the different State and municipal Boards of Health. The time has come when we may expect more and more fruits.

As regards the matter of vital statistics, he believed that Wilmington, Raleigh, Asheville, Charlotte, and other cities, make as accurate reports as their imperfect laws allow. In some of these towns the municipal laws require that the undertaker and the cemetery authorities must have a certificate of death before burial. An argument for the enactment of such a law is that an application for burial permit without a certificate would raise a suspicion of death by foul means.

He attributed to the publication of the *Bulletin* the satisfactory growth of the Board, saying there is nothing like printer's ink to inform the public of what we are doing, and the Board has used it lavishly. These tables will be printed and put in the hands of all the members, and they will see how the Board has induced, to use a mild term, the county authorities to improve the condition of public buildings.

He called attention to the prompt remedy the Board offers in time of the incursion of such diseases, as yellow fever, cholera or small-pox. The State has placed a contingent fund of $2,500 at the disposal of the Board for such an emergency. In case of the appearance such a disease the Superintendent of Health would report at once to the State Board of Health, who would send a committee and such assistance as was needed to stamp out the disease.

He mentioned the occurrence of glanders among horses in Wilmington about a year ago, when the State Board succeeded in blotting out the disease in two months. It is a disease not only destructive to animal life, but is also communicable to man, therefore it fell within the province of the Board of Health. The Agricultural Department had no provision for the arrest of glanders—a very surprising fact. The law of the State requires that animals so suffering shall be destroyed, but does not place the duty of determining the disease on anyone. We had no expert to diagnose the disease, so it devolved upon the Board to employ an expert.

He hoped the profession of the State would be interested not only to do what might be asked of them, but that they would study the matter so as to be able to instruct members of the Legislature as to what the the Board is doing and what we want. There are practical matters constantly arising, such as the healthfulness of drinking water. To make this plain, Prof. Venable has been studying the matter, and will read a paper giving the results of his researches.

Some months since the Board received information of the appearance of cerebro-spinal meningitis in La Grange among the students in a boy's school. This county is without a Board of Health, but the State Board secured the aid of the local physician, Dr. Hadley, who had consented to make investigations in regard to the water supply and other hygienic conditions.

Dr. Hadley being present, stated he had received a day or two ago the returns of the chemist of the Agricultural Experiment Station who examined the water, but he is not yet ready to report.

The report of Dr. Hadley's inspection revealed no local cause for cerebro-spinal meningitis, but will be inserted in another part of this report to show the effort made to discover the cause of sickness, which, may be added here, was conducted in the interest of the proprietor of the school as well as that of the general public.

Prof. F. P. Venable presented a paper on "*Sanitary Analysis of Water*," which is given in full elsewhere in this report.

EPIDEMICS.

During 1889 none of the pestilential diseases invaded the State to become epidemic, and, in fact, not a case of small-pox was reported during that period. Cholera, which had been predicted so confidently by those who had studied the course of its previous invasions, was not introduced into the country, and only one case of what was probably a sporadic case of cholera was reported, from Orange County. As the disease stopped there, we must hope that it was not really a case dangerous to the public health. Late in December there came mutterings of the far-off approach of La Grippe, and while some of us jeered at the facility with which everyone fell into the fashion of the hour even about an epidemic, in only a few months there were few persons in the State who did not have in their own experience some knowledge of it.

EPIDEMIC OF INFLUENZA: "LA GRIPPE."

The pandemic of influenza, or "grippe," as it was first named in Russia, was without parallel in the history of the world. This disease, with more or less variation in its general characters, was one of the earliest known epidemic affections. As far back as 1239 it was noted, and there were many recurrences of it in the fourteenth century. Full particulars were written of the disease in 1580 by Mercatus, picturing the catarrhal symptoms, pains in the head and back, limbs, and about the false ribs, surely identifying it with what we have learned later. In 1658 a notable epidemic occurred in England, which was described by WILLIS. Many aged, infirm and delicate persons were cut off by it. In 1675 there was another almost universal continental visitation of the disease, reaching England in 1676, and it is well to note that the slowness of its transference across the English Channel denotes the difference in the facilities then as compared with the present. In 1729 and 1730 there was another notable epidemic, appearing after severe and changeable weather at the beginning of 1729, and traversing the whole of Europe during the summer, autumn and the commencement of winter. It varied its general characters in different countries and different seasons. (COPELAND.) It was frequently not ushered in with chills or rigors, but by lassitude, depression, headache, pains in the loins and limbs, oppression at the chest, anxiety or pain in the epigastrium, coryza, severe cough, sore throat and heat of skin, the pulse being quick and irregular. Swellings of the parotids or of the tonsils were not infrequent, and the pulse was often remarkably small and weak. In other cases horripilations, vertigo, and rigors ushered in the disease, which sometimes assumed a severe character, delirium frequently supervening. When the complaint was simple it often terminated from the fourth to the seventh day by epistaxis, or by a slight expectoration of blood, or by the hæmorrhoidal or menstrual flux. In the more complicated cases, congestion of the brain or lungs, and dropsy of the chest frequently occurred, chronic bronchitis, consumption, and various other diseases appearing as sequelæ. It was most dangerous to the aged, and to those who had previous disorder of the respiratory organs.

Coming on down to 1775, we learn that the catarrhal epidemic occurred in Europe, and, like in its previous visitations, was not confined to the human species, but affected also the lower animals, often commencing with them. It broke out during a dry and warm summer, following a mild and very dry spring. This was the first epidemic which received the name of *influenza*, it having been so named in Italy from the belief that it was due to aerial influences. In the United States, according to Noah Webster, epidemics have occurred since 1775 in the following years: 1781, 1782, 1788, 1789, 1790, 1795 and 1797.

In our Southern country the disease has been noted by physicians and historians, and it will be inferred from the extracts made that the diseases spoken of are identical with that which visited us in 1889–'90. The following extract from the South Carolina historian, Dr. David Ramsay:

> Influenza, though a serious and frequent epidemic, has seldom been the subject of record.
>
> Many persons remember that the influenza, after traversing the United States in 1789, reached Carolina and spread extensively. It was very fatal on the plantations near the Northeastern line of the State, especially to prime, full-grown negroes. William Alston lost about thirty-five of that description. The whole mucous membrane, through all its recesses on the insinuses of the asfrontis, was most grievously affected. Deafness, loss of taste and smell for a long period were among its consequences. More have reason to remember the influenza of 1807. Gradually advancing over the Northern States, it reached Charleston early in September.
>
> It spared neither age nor sex, though children often escaped altogether; or, if attacked, got through with the disease with the least inconvenience. The reverse was the case with aged persons. It soon became so general that in some large families there was not a sufficiency of persons in health to attend on the sick. In a few weeks it is supposed that 14,000 persons, or half the population of Charleston, had been afflicted with the disease. Of these, forty-five died, thirteen of whom were white persons and thirty-two negroes. The former were generally aged persons. The disease spread on all sides into the country. The mortality in Georgetown and Beaufort was considerably greater than in Charleston. The disease in many cases was so mild as to preclude the necessity of application to a physician. In dangerous cases, when medical aid was required, bleeding, blistering, emetics, cathartics, and sudorifics were chiefly relied upon.
>
> The influenza, in its commencement, resembled the yellow fever, with a pain in and over the eyes, and with red streaks over their whites. A sharp acid scum was discharged from the eyes, and sometimes from the nostrils. In such cases a hoarseness and soreness of the throat was usual. The sense of smelling was sometimes impaired, the hearing was frequently injured, and in a few cases the powers of vision were diminished. A tightness and a stricture across the breast, with a dry cough, was common. The whole mucous membrane lining the fauces, nostrils and

bronchia was uncommonly stuffed with phlegm. In the aged the disease assumed the form of a pneumonia; in the young and the plethoric, that of a pleurisy. Persons who were of a consumptic diathesis, or who had been subject to old coughs or diseases of the breast, suffered most and oftenest relapsed. Spittings of blood and other precursors of consumption attacked such patients after the disease had in their cases apparently vanished and generally disappeared. An uncommon increase of consumption followed in the year 1808, which exceeded anything ever before known in Charleston.

Later on Dr. Daniel Drake in his monumental work on the "Principal Diseases of the Interior Valley of North America," says of influenza:

> The first and greatest invasion of this kind, which I have had an opportunity of witnessing, occurred in the year 1807. In the summer, or early in the autumn, the newspapers brought the intelligence of its prevalence in Europe, and afterwards it reached our Eastern cities. It was in October, when the weather was fine and steady, that it appeared in this locality. Two regiments of militia, called into the field to repel from our frontier a threatened invasion of Indians, were at the time encamped a few miles out of town, and I was then in attendance upon them. These men were its *first* subjects, the people of the town being still healthy. In a few days, however, it reached the latter, and then sought out the scattered inhabitants of the country. At that time there was but little communication between our settlements, yet I was able to ascertain that it spread far and wide among them.
>
> I need not give the history of any other prevalence, as this illustrates the most constant of the laws which govern influenza: *first*, its progressive extension from east to west; *second*, its independence of all sensible conditions of the atmosphere; *third*, its outbreak in bodies of men and compact settlements.

Writing of the symptoms of the disease at that date, he says:

> But the highest characteristic, not always present, was a sense of sinking and prostration, with a serious feeling of disorder throughout the whole system, indicating the impress of some malignant agent.

This running sketch of influenza (or grip, the latter known well to older citizens who remember the "Tyler grip," will recognize a very old name, rendered in French by the Russians, and started on its way around the world again,) will serve to show how many points of likeness characterize various epidemics. The one which visited us, seemed to have focussed all the grave symptoms known to all the epidemics of which we have any record.

Dr. James A. Hodges, a member of the North Carolina Board of Health, in an article presented to the Medical Society of North Carolina (*North Carolina Medical Journal*, October, 1890, p. 627), says about the epidemic:

> The recent epidemic, which has just visited us, had its origin in Russia about November 1, 1889. By December 15th the disease had spread over all northern Europe, and in the last week of that month it reached this country. It is doubtful whether to Boston or New York belongs the honor of having had the first case, but it is certain that both cities suffered severely from its ravages, over 200,000 cases being reported in the latter city within fifteen days after its first appearance. During the first week in the present year (1890) it reached this State, and in the two weeks following it was reported as prevalent in sixty-eight counties.

The epidemic, as it appeared in this State, was reported to this office by the Superintendents of Health under the several names of influenza, catarrhal fever and "La Grippe." It was first reported in December, 1889, thirteen counties out of the sixty-two reporting, being invaded, viz.: Caldwell, Chatham, Davidson, Duplin, Gaston, Greene, Guilford, Madison, New Hanover, Northampton, Orange, Union and Wilson. The disease was not reported as severe in any of these counties, and most of them reported only "a few cases."

In January the disease was reported from forty-four counties; in February from forty-five; in March from thirty-eight; in April from thirteen, while in May it was reported from only one county (Sampson). While in a few instances the disease was reported as very severe, and as causing several deaths by its sequelæ among aged people, as a general thing it was of a very mild type and did not increase the death-rate. This cannot be more plainly shown than by reference to the aggregate death-rates from the different towns in the State from which we receive mortuary reports:

	WHITES.	COLORED.	TOTAL.
October	14.7	22.3	18.2
November	11.1	19.4	15.3
December	9.6	22.4	15.9
January	12.2	20.1	16.0
February	12.2	23.0	17 5
March	11.5	17.1	13.9
April	13.5	16.9	15.2
May	13.5	21.5	17.2
June	12.6	28.7	20.1

Jones county is the only one that did not report the disease in any of these five months. Martin county reported influenza in dogs in January.

Nothing was learned during the progress of the epidemic which shed any light on the prevention of the disease, a matter which the Board of Health has most prominently in view. Fortunately the death-rate was small throughout the State, as compared with the death-rate in any of the States north of us.

OF OTHER DISEASES DANGEROUS TO THE PUBLIC HEALTH.

Pneumonia.—Next in importance to influenza came pneumonia, which, although it cannot be classed as a disease dangerous to the public health in the sense that it is communicable from one person to another (although such a theory has now a few advocates), it was a large cause of death, next in importance to that of consumption, reaching its highest points in 1889–'90, in the months of December, January, February, March, and its lowest point in August. This coincidence, between the prevalence of influenza in the same seasons, would suggest that the cases reported were due to the same epidemic influence.

Cerebro-Spinal Meningitis.—Evidently sporadic, occurred four times in 1889, one case each in January, February, October and November. In 1890 there were five cases, two occurring in March, two in August and one in September.

REPORT OF DR. J. M. HADLEY, OF LA GRANGE, ON THE SANITARY INSPECTION OF THE DAVIS MILITARY SCHOOL.

When it was ascertained by the State Board of Health that one or more cases of cerebro-spinal meningitis had occurred in the Davis School, the Board deemed it of sufficient importance to enquire at once into the condition of affairs, in order to protect the scholars, as well as to exonerate the proprietor from any charge of negligence that might be brought against him. With this end in view, Dr. J. M. Hadley, of La Grange, was selected to make the sanitary inspection and report to the State Board. We append his report :

Gentlemen of the North Carolina Board of Health :

In presenting my report of Sanitary Inspection of the Davis School and community, I desire to state that all cases of cerebro-spinal meningitis that occurred in barracks were attacked between January 1st and February 1st, 1890, and those who died in the village outside of barracks died between February 1st and 15th, all with well-marked symptoms, and some of a very violent form. Those in the town were all in the same community, from three hundred to six hundred yards in a south-west course from the barracks. Some nine months prior to the appearance of the first case of meningitis, the ditch leading from the mess-hall kitchen (into which slops were emptied) became offensive, because of the decomposing slops, &c., and remained so for two or three months. The cow-stalls and privy were also very offensive at the same time.

At the instance of the town authorities, from about June, 1889, the offensive slops and fœcal matter were hauled out of town, and about October, following, the cow-shed was moved out of town also, and all the surroundings seemed very pleasant.

Notwithstanding the territory near the ditch and cow-shed was thickly settled, not a single case occurred in the neighborhood outside the barracks. Since the suspension of the school in February, not a single case has occurred in the village or surrounding country. Indeed, the health of this community was never better.

At the time of my examination, after a very thorough inspection, I found everything in good condition. Could it be possible that the condition of things above named, together with the unusually mild winter, could develop the disease in question after so long a time intervening?

I desire to express my appreciation of the hearty co-operation of Colonel Davis and his father, Dr. A. C. Davis, and also of the town authorities in attempting to ferret out the cause of the terrible disease.

Respectfully submitted,

J. M. HADLEY, M. D.

In the water analyses—

Sample "D. G." located in parade grounds and used by cadets.

Sample "D. K." located near mess-hall and used for table and cooking purposes.
J. M. H.

ANALYSIS OF WATER FROM THE WELLS AT THE DAVIS SCHOOL AT LA GRANGE.

Analysis No. 6377.

THE NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION,
RALEIGH, May 6, 1890.

SIR: The sample of water sent to the Station for analysis in a bottle, marked No. 2, D. K., contains:

Total amount of mineral matter in solution, 2.91 grains per U. S. gallon; chlorine, .83 grains per U. S. gallon; carbonate of lime, .08 grains per U. S. gallon; ammonia (free), .034 parts per million; ammonia, (albuminoid), .058 parts per million.

A very pure water. Your obedient servant,

H. B. BATTLE,
Director.

To Dr. J. M. Hadley, La Grange, N. C.

Analysis No. 6376.

THE NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION,
RALEIGH, May 6, 1890.

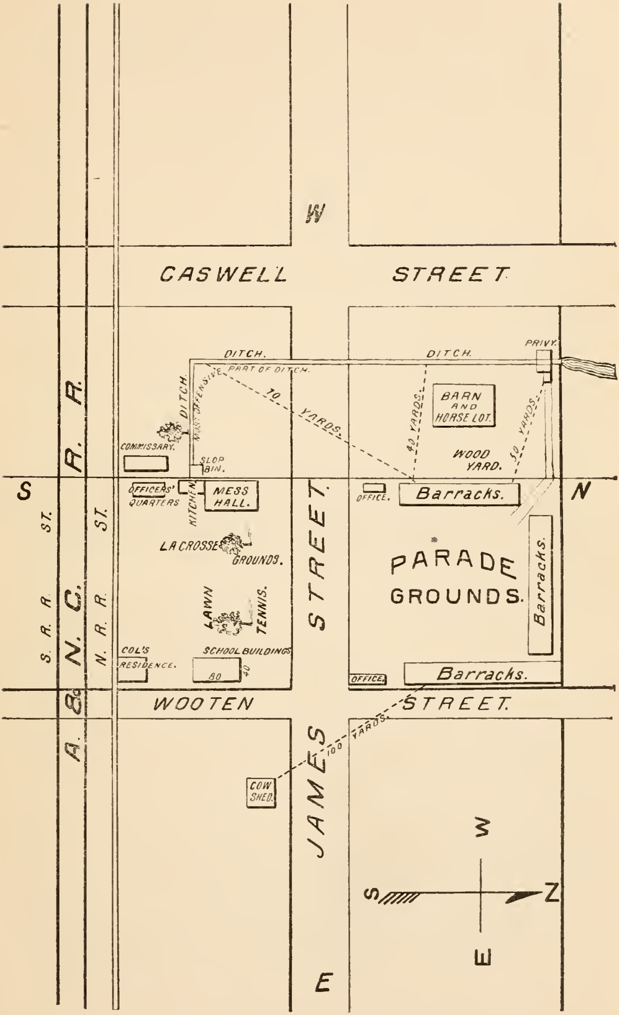
SIR: The sample of water sent to the Station for analysis in a bottle, marked No. 1, D. G., contains:

Total amount of mineral matter in solution, 2.08 grains per U. S. gallon; chlorine, .50 grains per U. S. gallon; carbonate of lime, .25 grains per U. S. gallon; ammonia (free), .024 parts per million; ammonia (albuminoid), .016 parts per million..

An exceedingly pure water, probably the purest we have ever examined.

Your obedient servant, H. B. BATTLE,
Director.

To Dr. J. M. Hadley, La Grange, N. C.


W
CASWELL STREET
DITCH.
DITCH.
PRIVY.
PART OF DITCH.
DITCH.
MOST OFFENSIVE.
70 YARDS.
40 YARDS.
BARN AND HORSE LOT.
50 YARDS.
WOOD YARD.
COMMISSARY.
SLOP BIN.
S
N
OFFICERS' QUARTERS
KITCHEN.
MESS HALL.
OFFICE.
Barracks.
LA CROSSE GROUNDS.
PARADE GROUNDS.
Barracks.
LAWN TENNIS.
COL'S RESIDENCE.
SCHOOL BUILDINGS
80
40
OFFICE.
Barracks.
WOOTEN STREET.
100 YARDS.
COW SHED.
JAMES STREET.
S. R. R. ST.
A. & N. C. R. R.
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SPECIAL INQUIRIES BY THE BOARD OF HEALTH.

QUESTION 1. Did any cases of cerebro-spinal meningitis occur at the Davis School? A. There were two cases. One died on the 9th of January, the other on the 5th of February.

Q. 2. Did any of the cadets sicken at the school and die at their own homes subsequently? A. One young man who left school apparently well died at his home a few days thereafter. His physician wrote that he died of same disease.

Q. 3. Did any develop disease after their return home? A. One other young man, who went home well after the suspension, developed symptoms of the disease, but soon recovered.

Q. 4. Character of the school building and dormitories; (*a*) how located for drainage; (*b*) how ventilated; (*c*) how warmed; (*d*) cubic space in each room, and number of students accommodated in each? A. Wood building, 40 by 80 feet, three stories, 15 by 13 and 12 feet between joists, well ventilated with numerous large windows with weights; (*a*) barracks well located and drainage thorough; (*b*) ventilated in usual manner; (*c*) warmed by stoves; (*d*) wood buildings, rooms 12 by 13, 9 feet high, two boys in a room.

Q. 5. Food, as to quantity and quality? A. Unlimited as to quantity and time; fresh beef and bacon every day for breakfast and dinner, with at times fish, eggs and poultry; flour used of the "Best Family"; potatoes of both kinds always on hand and used daily; no meat at supper; biscuit, rolls, batter-cakes, muffins, with butter and syrup, make up the meal; fruits occasionally; experienced cooks, and meals well prepared.

Q. 6. Water supply; from well, if so through what kind of soil; how deep and how far from all sources of infection? Give analysis as made by State Chemist. A. From driven wells—through sandy soil and a substrata of pipe clay—26 feet deep. See Analysis.

Q. 7. How many hours of study and drill in the twenty-four? A. School hours from 8:30 A. M. to 4:30 P. M.; dinner from 12:15 to 1:30 P. M.; retire at 9 P. M.; rise at 6 A. M.; drill from 5 to 5:45 P. M., in good weather only.

Q. 8. Rooms heated by stoves, furnaces or open fire-places? A. Wood stoves.

Q. 9. What was the cause of the suspension of the school? A. Fear of an epidemic.

Q. 10. Are any steps being taken to reopen? A. No; will resume work at usual time in September.

Q. 11. Have any cases occurred in La Grange or the surrounding country? A. Yes; two well defined cases of meningitis died in town outside of school. I heard of two other cases with suspicious symptoms—all died.

Diphtheria.—This disease occurred every month in the year for 1889 and 1890, reaching its highest intensity in the months of August, September and October.

In dealing with this disease we recognize many difficulties. It is only third in its rate of mortality, consumption and pneumonia having the precedence. When we remember that diphtheria is a disease of comparatively modern introduction, although known to have existed here and there for more than a century, the sanitarian is exercised to provide means for its limitation, or if possible its extinction. It is more and more apparent to all public-health officers that isolation and the destruction of all the clothes used about the sick chamber, thorough disinfection of all the articles of furniture, the walls and everything that could have come in contact with the patient should be strictly enjoined. The difficulties which arise cannot now be overcome until there is some law giving health authorities executive power enabling them to quarantine cases of diphtheria. The Board has published a pamphlet on the restriction of diphtheria, from the pen of one of its former members, Dr. R. L. Payne. The best that can be done now is to depend upon the physicians in attendance to notify the public of the existence of cases, and, especially in the case of school children, to notify the teachers or superintendents. We find the teachers of our public schools alive to the interests of their pupils in this matter, and by their intelligent influence panic and the spread of the disease are measurably averted. In the towns the spread of the disease is rather more under some degree of surveillance, for the gravity of the sickness drives many a horror-stricken mother to institute her own means of non-intercourse, successfully, too, in many cases, but nearly always accompanied by some degree of panic.

More than ever the medical profession is looking forward to the day when there will be a prophylactic inoculation against diphtheria, and already it has been announced by Sir Joseph Lister that the world would soon be rejoicing over such a discovery by the world-renowned Dr. Koch.

Scarlet Fever (scarlatina), the twin-sister of diphtheria, has been present every month of the years 1889 and '90, except in March of 1889 and March of 1890. It has been of a remarkably mild type—one attack furnishing protection against a second. When the disease is not of great severity, it is not so much to be dreaded as diphtheria, except as to the sequelæ. The remarks upon the limitation of diphtheria apply equally well to scarlet fever.

Dysentery.—The epidemic form of dysentery still remains one of the most serious diseases of the districts outside of our larger towns. Its fatality is very distressing. The spread of the disease must be largely due to the careless way in which the dejections are disposed of among patients of the humbler sort, but is not confined to them. No direct contagion may be attributed to the disease, but that indirect but equally certain way through the medium of the stools is pretty well demonstrated ; and we cannot too earnestly urge upon the people to see that a case of dysentery is as carefully nursed, and the evacuations of the bowels as thoroughly destroyed by chloride of lime solutions as is practiced in typhoid fever. It is well known, too, that the virulency of the disease is greatest in the months of May, June, July and August, and that the starting point may be in improper diet or imprudent change of clothing ; and there is an increasing belief among physicians that an abundant source of dysentery in the spring and summer is from the condition of fresh meats offered for sale in our towns. When it is known how half-famished beeves and sheep are slaughterd after long journeys on foot or by railway, and that the slaughtering commences with the feeblest, and that there is no adequate inspection of our markets, and absolutely none of our slaughter-houses, it is not strange that we are served with improper flesh food.

Dysentery occurred in nearly every month of the years 1889 and 1890, and needs to be more carefully studied by our County Superintendents of Health. It is, in a large measure, a preventable disease, and it is from this standpoint all Superintendents should view it. The moment cases having the diphtheretic character occur in a community, a careful study should be made of the surroundings of the case, and the people should be instructed how far healthy food and good water go to preserve the health, and where the water is suspected, citizens should be counselled to drink no water until it is boiled. The latter object may be more readily obtained by advising them to drink entirely tea or coffee, as in this way we insure the previous boiling of water.

Malarial Fevers.—In some form or other malarial fevers of true marsh miasmatic type are always present in this State. Every month in the year some form of it may be found. We note particularly that hæmorrhagic malarial fever, sometimes called yellow chills, was more prevalent in 1890 than in the year previous. This was probably due to the remarkably mild winter of 1889–'90. There were few killing frosts in the eastern counties, a condition so necessary for the destruction of the malarial poison, and it was noted in the fall of 1890 how many cases of old-fashioned fever and ague occurred, after an absence from sections for many years. It is remarkable that hæmorrhagic malarial fever was reported in March, April, May, June, July, August, September and October of 1890, while in 1889 it was reported in only September, October and November. It is essentially a disease of the autumn, and its occurrence in the earlier months is due, as we have already said, to the spring-like condition of the whole winter.

Pernicious Malarial Fever.—Also a form of fever of serious nature, known also as congestive chill, was reported as early as February in 1890, and was reported for two spring months and for June, July, August, September and October. In 1889 fewer cases were reported, and they were later in the season than we usually expect them. It is interesting to observe in this connection that typho-malarial fever was remarkably less in number and in range of season for 1889–'90 than for some years previously.

The prevention of all marsh miasmatic diseases is in drainage, the habitual employment of good cistern water and the avoidance of exposure in the night air and intemperate habits; good, thorough underground drainage, the substitution of good cistern water for spring water of the marl regions of the east; and in the towns, covering the malarial area with houses and paving the streets, has, in more than one instance, transformed the practice of medicine. The city of Wilmington may be cited as an example of this change. Preventive medicine can never grasp with the stupendous problem of transforming all of our alluvial river bottoms into healthy regions, but the prophylax of malarial fever medically, and by means of correct sanitary improvements, promises as much for the outlay of money as that for any of the diseases known to be preventable.

The Minor Contagious Diseases—among which may be classed chicken-pox, mumps and whooping-cough—were present during nearly every month of the two years, but they seldom have profounder effects than temporary disability, chiefly in loss of school hours among the children.

Typhoid Fever.—Typhoid fever was present in North Carolina for every month of the two years 1889 and '90, and general in its distribution. The accumulation of knowledge on this subject shows that it is the most dangerous of all our diseases. It is present at every season of the year, its victims are usually the young, who, if they recover, are liable to sequelæ which impair the constitution for a long period. Being a disease not alarming enough to cause the patient to be isolated—except in some sections where the contagion theory is acted upon without the necessity of instruction of a physician—few safeguards are employed to prevent communication of the well with the sick; and what is more minutely connected with the spread of the fever is the careless way in which the contents of the bowels are disposed of. In the country and in the towns where there is no sewerage the dejecta are thrown into privy vaults or into boxes on the surface without being previously rendered harmless. It is even worse in cities and towns having sewerage, as these facilities for getting rid of the dejecta lead to false security, and where the plumbing is defective an additional danger is sure to be lurking. It does not take any prophetic ken to predict that typhoid fever is going to reach higher ranges of prevalence in the not far distant future, for our actual knowledge of its causation and spread is sufficient to predict this belief. Our towns are adopting systems of sewerage, or extemporizing sewers with cess-pool receptacles, ensuring thereby a seething putrefying mass, a genuine hot-bed for the growth of the typhoid bacillus. In short, the key to the whole practice of prevention lies chiefly in one thing which can be easily managed, viz.: the destruction of the discharges of the bowels (and, may be, of the urine). Having done this intelligently, the head of the family may feel some assurance of working in the right direction.

The aid of municipal authorities is of great importance in this matter of the prevention of typhoid fever. Wise laws promptly executed controlling the management of privy vaults, abolishing all sewerage emptying into cesspools, and permitting plumbing to be done by none other than skillful workmen, under corporate license, will serve to check the negligent and to stimulate the indifferent to a proper care of their surroundings.

Phthisis Pulmonalis.—Consumption heads the list in its annual fatality. It is confined to no section, although our statistics go no further than the returns from fourteen cities. It is remarkable, in noting the statistics of death, how largely that among the colored population exceeds that of the whites. The following ratios from the reports of 1889 will show the facts: In Asheville there were 10 deaths among the whites to 11 among the negroes; in Charlotte, 7 to 20; in Durham, 7 to 5; in Fayetteville, 5 to 9; in Goldsboro, 1 to 4; in Henderson, 1 to 5; in New Berne, 9 to 26; in Oxford, 3 to 4; in Raleigh, 4 to 7; in Salisbury, 4 to 6; in Wilmington, 11 to 62; in Greensboro, 4 to 10; in Tarboro, 2 to 3; in Statesville, 4 to 2.

The consumption among the negroes in our towns has very largely increased since their emancipation, and has been a topic of serious discussion among medical men. Those physicians who have given the topic the most profound study, and who have followed the cases into the dead-house, are of the opinion that there is a marked difference in the nature of the disease between the blacks and the whites, and some have gone so far as to consider the majority of the cases to have their origin in syphillis, either hereditary or acquired, which is so largely prevalent among the negroes.

Practically, we have to consider several problems in relation to the spread of phthisis in this State in view of the marked influx of consumptive patients as residents in the sanitaria, and as visitors in private houses and hotels. California, through her physicians, has spoken out decidedly against the influx of consumptives into her borders, deeming their territory of far too much value to turn it to the questionable purposes of sanitaria. In considering the question of prevention and restriction of the disease, we will not commence too early if our Superintendents of Health begin now to investigate thoroughly the experiments being made at different points. The contagiousness, or, at least, the communicability of consumption by means of the tubercle bacillus of Koch, is accepted by many good observers, and with a knowledge of this highly probable theory we have the ground-work for practical action. Consumption is not communicated by breathing the exhalations of the lungs of consumptives, nor from the moist expectorations, but from the dried matter. It is, therefore, necessary to destroy the sputa, prevent spitting upon the floor or carpets, provide spit-cups for such patients that can be burned up with their contents.

The discovery which Dr. Robert Koch, of Berlin, has recently announced to the world is undergoing a most searching trial in every part of the world, and it is premature to say how much importance is to be attached to it. It is safe to say that if one-half of the estimate put upon it by its gifted discoverer be true, we will live to see the day when consumption will sink to the insignificance of small-pox. The medical profession of the world who have been the recipients of the previous grand discoveries of Dr. Koch, viz.: the isolation of the tubercle bacillus, and the isolation of the cholera bacillus, have reason to repose profound confidence in the truthfulness of all his methods, and, if his hopes are not realized in this last discovery, he will have done work of stupendous importance by advancing our knowledge of bacteriological research to a point from which we may, with safety and confidence, progress towards future successes in preventing inoculation.

THE DISEASES OF OUR DOMESTIC ANIMALS.

The Board, recognizing the relations known and unknown between the domesticated animals and the human family, have endeavored from the beginning to keep an account of the spread of it among the chickens and hogs, and also to be on the alert to prevent the introduction and spread of glanders.

GLANDERS IN WILMINGTON AND NEW BERNE.

The following account is taken from the *Bulletin of the North Carolina Board of Health*, for April, 1889:

Mr. Isaac Rhodes bought a drove of horses from a drover from Pittsburg on the 15th of February. On the 10th of February, Messrs. Boney & Harper bought a mule from this drove. The animal was a fine one, and apparently healthy, but was confined to the stable shortly after purchase with lameness, making in all three weeks. Discharge from the nostrils was noticed after a lapse of about forty days from his time of arrival. Having no knowledge of glanders, the purchaser, by accidental inquiry, discovered the nature of the disease. On the 8th of April he directed a man to take this mule out of town and shoot him. Tuesday and Wednesday elapsed and it was discovered on the 11th that the man who had been ordered to kill him gave him away to a colored man. When this was ascertained steps were taken to discover the whereabouts of the animal and have him killed and buried. For this purpose the Chief of Police made a detail of police. On the 6th of April a second mule was taken with the disease, and on the 7th of April a pony, all having caught the disease from the first animal. Two more animals, a horse and a mule, from the same stables, are under observation.

Mr. D. W. Thompson, of Abbottsburg, bought two mules from the same drove in Wilmington, and intelligence was received to-day (the 13th) that both animals died with glanders.

This is the first visitation of glanders, so far we can learn, and immediate steps will be taken to isolate all animals suspected, and destroy all the probable foci of propagation.

The symptoms of glanders, as given by Prof. Law, in "*Pepper's System of Medicine*," are, in the abstract, as follows:

The incubation period is from three to five days in inoculated cases, when by infection it has extended over years. At the outset there is fever, languor, loss of appetite, and a serous nasal discharge, often from one side only. By the 6th day this becomes yellowish, the margin of the nostril is often swollen, and upon the mucous membrane may be detected elevations of various sizes, of a general yellowish tinge, dotted with minute red points, and surrounded by a bright-red or purple or slightly elevated areola (*i. e.*, a circle of inflammation). At the same time the glands under the jaws on the side corresponding to the discharging nostril, become the seat of a hard nodular, painless enlargement, feeling like a mass of peas; they do not often ulcerate. Excessive hot, painful engorgements often appear on different parts of the body; if on the limbs or joints, cause lameness. Soon the swellings on the mucous membrane of the nose change their character to ulcers, which tend to eat deeply. These ulcers have reddish, gray or yellowish-red borders, bleed readily, and may be black from hemorrhage, or greenish, or of some other shade, from decomposition. The discharge is always sticky, but may vary in color from white to yellowish, greenish, brownish or red. By the 6th or 15th day the height is reached.

The sides of the nose are glued together by the drying discharge, and this, with the swelling, renders breathing difficult. Death usually ensues from suffocation.

The chronic form of glanders may set in insidiously, but there is usually constitutional disturbance, the frequent premonitory symptoms being intermittent or continued lameness, swelling of the limbs, cough, bleeding from the nose. Although the general health may appear good, dullness of the eye, dryness of the coat, lack of endurance, and debility soon show themselves. The tendency of the nostrils is to glue together, and mucous is expelled in masses by snorting. Ulcers can be seen low down in the nasal passages, especially over the mucous mem. brane of the dividing wall of the nose. A case may remain indolent for years, spreading infection.

TREATMENT.—Prof. Law says: "Considering the great danger of multiplying and preserving the germs of the disease, so fatal alike to man and beast, the treatment is *never* commendable.

PREVENTION.—"The glandered horses and all animals attacked with the accute or obstinate disease should be destroyed and their bodies be burned or deeply buried.

"Every State should legally interdict the use of a glandered horse or his exposure in any public or other place where infection is likely to reach other animals by contact through fodder, litter, stable utensils, or any other object employed about animals. No less imperative should be the perfect disinfection of all stables, harness and other objects with which glandered animals have come in contact."

The doctrine of contagion is the only safe one, and it is best to sacrifice a few animals at the proper time than to run the risk by vacillating and temporizing experiments. Detention for inspection in isolated places, after the disease has been diagnosticated by capable persons, is very objectionable.

A corral of detention has been established at Mt. Tirza, four miles from the city, where all horses will be sent that are under suspicion of glanders, but have not shown decided symptoms. As soon as symptoms of the disease appear, the animals will be shot and their bodies burned or buried.

Section 2488, of the Laws of North Carolina, says:

"Any person who shall sell, or offer for sale, or who shall use, or expose, or cause or procure to be sold or offered for sale, or to be used or exposed, any horse or other animal having the disease known as glanders or farcy, or any other contagious or infectious disease known by such person to be dangerous to life, or which shall be diseased past recovery, shall be guilty of a misdemeanor;" and,

Section 2489 says:

"Every animal having the glanders or farcy shall at once be deprived of life by the owner or person having charge thereof upon discovery or knowledge of its condition, and any such owner or person omitting or refusing to comply with this section shall be guilty of a misdemeanor."

By the request of this Board to the Chief of the Bureau of Animal Statistics, Dr. W. H. Wray, United States Veterinary Inspector, arrived in this city Sunday night, the 14th April. After viewing the diseased horses, and making a careful diagnosis, he pronounced the disease to be glanders, and they were immediately killed. Dr. Wray also made a careful examination of all horses in the livery-stables and others, and pronounced them free from any symptoms of this disease, and left Wilmington the night of the 16th.

In May Dr. Leinster Duffy, Superintendent of Health in Craven County, reported distemper among horses, the exact nature of which he was not able to decide.

Dr. Duffy reported in the *Bulletin of the North Carolina Board of Health* for July, 1889, page 68:

> There has been an epidemic of distemper among our horses, and four cases of glanders were discovered, two in the city [of New Berne] and two in the country. Two of them died before the arrival of the United States veterinary expert sent us by request of the State Board of Health. The others were killed as soon as examinations were completed; no new cases yet reported.

Glanders is a disease of great gravity in its relation to the public health, being transmissible to persons having the care of them, and in this view of the case it was clearly the duty of the State Board to act promptly to suppress it. Another consideration of hardly less gravity, when we estimate the greater liability to its spread among horses than among men, is that horse-owners in town and country should be notified of the invasion of the disease. But as few of the most intelligent horse-dealers and managers are able to distinguish the disease authoritatively, the State should have some veterinary practitioner to appeal to in the diagnosis and care of the animals.

The application of this Board to the State Agricultural Experiment Station elicited the reply from the Director, Dr. H. B. Battle, that no provision had been made for the suppression of pestilential diseases among animals. Evidently, from the accumulation of facts concerning the diseases of domesticated animals, and the skilled researches which are being made for the discovery of an inoculating fluid to protect against

SWINE PLAGUE AND HOG CHOLERA,

it will become necessary for the State to take an active part in such work as will place the farmer in possession of all the facts necessary to protect his herds of swine. It is a matter of serious concern that in our State immense sums are lost annually by the death of hogs from cholera and swine plague, and that very large amounts of money go to the West for the purchase of meat.

It is not from this standpoint, though, that this Board views these diseases, but from that of the communicability of the diseases of these animals to man. Tuberculosis is a common disease with beef-cattle. Tape-worm, also, has its origin in the same source, while trichinosis is the commonest affection among our swine.

TUBERCULOUS FOWLS.

Tuberculous fowls are often exposed for sale in our markets, and other diseases not known as yet to have any relationship to our own diseases are increasing. One of the earliest practical reports on the transmission of consumption to the domestic fowl was made to the Medical Society of North Carolina at its annual meeting in Durham in 1884. This short report gave an account of a demonstration of the inoculation of a flock of dunghills that gobbled the sputa discharged by a consumptive on his lawn. The other part of the question is not yet settled whether or not tuberculosis is given to those who consume this diseased flesh.

MORE CAREFUL INSPECTION OF MEAT.

Knowing the facts, though, this Board deems it necessary to recommend a more systematic, vigilant inspection of meats by men who are able to detect such diseases. Municipalities seem not to be aroused to the lurking dangers, and every means should be used to aid them.

The dangers to the people, as great as they seem to be are only to a small extent seen in the markets. There the visible things that either attract or deter the purchaser may be non-essentials. Even the high-smelling meat which has made the journey of half the continent may not be so dangerous as the more attractive steak with its eggs of tape-worms. The purchaser is governed only by those things which appeal to his sight and smell, while neither of these senses would be sufficient to protect against harm. Only a little skill with a pocket lens is sufficient to determine many of the most harmful of the residents of the flesh of animals.

The following quotation from *Leuckhart's Parasites of*

Man will emphasize more fully some of the facts heretofore sketched:

Many animals, especially smaller ones, actually use the eggs of entozoa as food. I have myself observed specimens of gammarus and asellus aquaticus feeding upon eggs of echinorhynchus which I had placed in the aquarium; others again take in the eggs accidentally along with their food, in greater or less numbers, sometimes still protected by the covering of the body of their parent.

In the latter way grass-feeding ruminants are infected with the eggs of several tape-worms which live in the intestines of dogs. The "proglottides" of these worms crawl out of the fæces and deposit their eggs upon grass stalks. I may also mention here *Tenia Saginata* (mediocanellata) of man, the eggs of which are transferred in the same way to the stomach of the ox; the pig generally becomes infected with *Tenia Solium* (tape-worm) by feeding directly upon human ordure, and the meat-worm devours along with the excrement of mice, the contained eggs of *Spiroptera munia*, while the larva of the cockchafer takes in the eggs of echinorhynchus gigas with the fæces of the pig. Man himself is frequently attacked by parasites in the same way, and dogs, when licking their master's hands, deposit the eggs of *Pentastomum*, which are thus easily transferred to the alimentary canal.

These few examples show how the germs of parasites are taken in with food.

We continue to quote from *Leuckhart's Parasites of Animals*:

THE TRANSMISSION OF PARASITES BY THE USE OF FLESH AS FOOD.

When flesh is eaten raw, as is the custom in Abyssinia and elsewhere, the possibility of transference requires no special proof. The worms thus swallowed develop as surely and constantly as in animals under experiment, provided only that they find in their new host the conditions essential for their further development, and that they are not injured by the mechanical process of eating. It is thus sufficiently evident why *Tenia Saginata* (tape worm) is found in young and old among the Abyssinians who eat raw beef, and why Europeans are also rapidly infested when they begin to live *a la Abyssinienne*.

It is obviously otherwise among civilized people, where it is customary to cook the flesh used as food. The danger of infection with the young worms is by this means to some extent lessened, though the protection thereby afforded is only a limited one.

We may first of all note that, in spite of the general prevalence of the custom of cooking food, there are yet by-ways open for the introduction of parasites. Raw meat is prescribed by the physician in many diseases as a special nutritious food. During the preparation of certain kinds of food (especially sausages and meat-balls) the raw flesh is tasted by the butcher, cook or housewife, in order to estimate the proper quantity of salt or pepper. Further, in this state it forms the favorite food of many persons, and even whole classes, *e. g.*, the workmen in the manufacturing districts of North Germany. It may also happen that we derive parasites from sausages or ham which has come in contact with infected pieces of flesh or with living worms in the butcher's shop. The bladder-worm of the pig, or its head, is often accidentally introduced in this fashion, especially since the butchers, knowing the law against measly flesh, take the greatest care always to cut away and remove the parasites when they appear on the surface.

Where the custom of private slaughtering prevails, as in the middle class families of North Germany, the parasites may be found in the kitchen or store-room, and thus arise many possibilities of transference and importation. One may, of course, urge that a bladder worm could hardly be overlooked or inadvertently swallowed, but the head is enough for the development of the tape-worm, and, being easily separable, could not in this state be distinguished from a little lump of fat without close examination.

Cooking—even boiling and roasting—is not a constant or sufficient protection against infection. It has indeed been asserted and observed that living intestinal worms (usually *Ligula*, but sometimes also the so-called *Filaria piscuim*) are occasionally found in boiled fish. Experiments were made by Pallas and by Bloch in order to test the truth of this. The worms were cooked—some alone and some within their hosts, which are usually small. The results were, however, only doubtful, but it is impossible any longer to doubt the correctness of the statement. By my experiment in 1860, in the first edition of this work, I proved that trichinous meat is by no means thoroughly disinfected by the usual treatment, and as little by salting as by smoking. This statement which, therefore, applies to salt pork, smoked sausages and ham alike, has been corroborated, both by observation and experiment, and thoroughly overthrows any faith in the harmlessness of the flesh we use as food. One must not, of course, think that heat and smoke (pyroligneous acid) and salt are without any effect on the parasites lurking in the flesh. On the contrary, one is at once convinced that these various influences are wholly, though to different degrees, hurtful to the worms; but this also is certain that the action must attain a certain intensity and last a certain time before the worms die. *Trichina* does not perish till acted on by a temperature of from 62° to 69°, C.; but the temperature which usually prevails in the interior of the flesh during boiling or roasting is often somewhat below this, and in case of large masses, or rapid cooking, is so very far from it that the interior remains bloody. In such cases neither the developmental power nor the life of the inmates could be very seriously affected. Much the same may be said of other (cold) methods of smoking. We know of many and serious illnesses which have resulted from the parasites derived from ham or brain-sausage. The danger of partaking of such kinds of food is greater since *Trichina* sometimes remains living for months in masses of flesh so preserved.

I may further take this opportunity of noting that *trichina* has a special and uncommon power of resisting external influences. It cannot only remain living for weeks in the summer time in putrefying muscles, but is, to a most remarkable extent, insensitive to cold or frost. During the cold part of January (at about 20° to 25°, C.) I left a portion of trichinous flesh three days and three nights in the open air, and after thawing it in cold water, gave it to a rabbit. I hardly looked for any result, and was most astonished, after an interval of three weeks, to find the animal emaciated and paralyzed. Death ensued eight days later, and I then convinced myself that it was throughout infested with *trichinæ*.

Such considerations make it probable that the facts established in the case of *trichinæ* cannot be directly applied to other worms. Indeed, cysticerci are killed by a temperature of 50°, C., and, therefore, much sooner than the *trichinæ*. Their possible length of life in preserved foods is also shorter, rarely exceeding four or five weeks. But there is here, also, sufficient possibility of infection, which is indeed easy enough in the case of *trichinæ* saginata, since beef is often eaten in a half-raw state, even after cooking.

To allay the apprehensions of our reader, we must not forget to mention that infection through the medium of boiled flesh is, on the whole, rare, since in the great majority of cases the parasites are killed by the ordinary culinary treatment. This is as true of *trichina* as of bladder worms, as statistical results clearly prove. Thus, according to official reports, there are above 30,000 swine eaten yearly in Leipsic, out of which, according to the results of the Brunswick investigation, (which furnish as yet the most favorable fraction, one trichinous pig in 5,000) there ought to be at least six infested with *trichina*. If the parasites were not rendered harmless by cooking, we ought, obviously, to expect six epidemics of *trichina* yearly, while in reality, apart from a few isolated cases, there have been only two observed since 1860—a severe one in the winter of 1877, and another less serious. In Sweden, where, in many districts, 1 per cent. of the swine are trichinous, the disease is only known as a sporadic malady, and as such only rarely.

We have spoken mainly of the pig and the ox, since these animals furnish the largest proportion of the food used by civilized people, and, so far as we know, are the most common sources of parasites But we are also aware that other kinds of flesh may also infect us with parasites. Thus the pig harbors the cystic stage of *Tænia saginata*, though not so frequently as the ox; the sheep and deer sometimes contain the bladder worms of *Tænia solium*. Further, we may find *trichina* in the flesh of martins, foxes, rats and hamsters, which are here and there used as food. The assertion of Herbst that pigeons and other birds are also infested with encapsuled *trichina* is based on an error, for we are not yet acquainted with any bird capable of infecting man with worms. It is otherwise with fishes, for we have obtained convincing proofs, through the observation and experiments of Brann in Dorpat, that the pike, although it remains questionable whether this is the only fish that lives so, yields young stages of *Bothriocephalus latus* to human beings. It is to be assumed that *Bothriocephalus corpatus* of Greenland is also derived from the flesh of some marine fish which harbors its young stage. It is found, not only in man, but in dogs which are fed by the Esquimaux, for the most part, on raw or dried fish. At any rate, it must be some inhabitant of the water which harbors the young stage of the human *Bothriocephalus*, as we infer with every certainty from the crested ciliated coating, by means of which the embryos are able to swim about.

The introduction of the germs of Helminths can also easily take place through small terrestrial or aquatic invertebrates. Chance must, of course, determine many of the methods of infection. We should as little think of eating a living snail as a bladder worm. But such an animal is easily hidden among salad and vegetables which we eat raw, and this is specially likely when they have grown in damp places, as is the case with water-cresses. Similarly, when eating roots, fallen fruit, etc., we may easily swallow worms, insects and other small animals without noticing it, and be infected with parasitic germs of various kinds, and when such creatures are eaten as food, or as tid-bits, as happens especially among savage people, other methods of infection are obviously open.

We know, of course, as yet but of instances which prove a transmission accomplished in this way. Infection of *Tænia* cucurnerina must be referred to this class. This parasite occurs not infrequently in children and is transmitted through the dog-louse (Trichodectes) in which the worm is in its immature stages; but this mode of transmission is probably rare and local.

Under some circumstances drinking water is the medium of infection. This is especially the case when the water is derived from ponds or reservoirs inhabited by numerous small organisms or abounding in organic remains. Small crustacea (cyclops) swallowed along with the water transmit the guinea-worm, which, according to Fedcheuko, passes its early life in these animals. And, besides, transmitters of parasites, which here and there are in such waters free-living immature stages of such worms as *Dochmius Trigonocephalus*, which are carried with water into the intestines and there settle down. E. N. D.

SLAUGHTER-HOUSES SHOULD BE INSPECTED.

Nearly all the evils which threaten consumers of flesh food could be corrected by proper inspection of slaughter-houses. Cattle are often delivered to slaughter-houses in a very poor condition, many times diseased, and unfit for food. There are no conveniences for pure water and food, so that, to save from loss, these animals are slaughtered as fast as can be, beginning with the ill-conditioned. This may not be true of every slaughtering establishment, but in the great majority of them, there is the scantiest provision for the welfare of the cattle. It would seem to be a part of economy to supply the animals to be marketed with good food and water that their weight be not reduced, but such ideas do not prevail.

Habits of uncleanliness abound in most of these places, and it is reasonable to venture that if the consumers could look on at the slaughtering of animals and note the disregard of cleanliness, the amount of butcher's meat sold would be greatly decreased. Fortunately for the consumer, fire has great power to purify, and thorough cooking mercifully delivers from the objectionable things and from the harmful things which often lurk in such food.

It is a practice with some butchers, in fact with most of them, to feed the hogs on the offal of the slaughter-house. They have no protection from the weather, are confined in a pen knee-deep in liquid filth, and are, in fact, placed in the very best conditions for disease. The hog is not a a meat-eater, but his voraciousness leads him to eat anything within his reach, and this economical habit is made use of by the butchers in a most disgusting way. If a lot of beef or other meat is about to spoil, it is thrown into cauldrons where it is boiled for food for the hogs. This is thrown to them on the ground and they devour it greedily. When we consider that these animals are in this way being prepared for market, it is a wonder that we do not have more sickness from eating such food.

The condition of the slaughter-houses is not confined to North Carolina or any part of the United States, but is very common in some sections, as the following quotations will show.

The author of this inspection report, Dr. R. Harvey Reed, of Mansfield, Ohio, is an active sanitarian of extensive reputation for his untiring zeal, and for his honest dealing with questions appertaining to the public health. Dr. Reed made this inspection and furnished this report to the Richland County Humane Society, November 21, 1890:

SLAUGHTER-SHOPS OF MANSFIELD INSPECTED BY THE CITY HEALTH OFFICER, R. HARVEY REED, M. D.

On the strength of a score or more complaints from as many different citizens, the sanitary policeman and your health officer made a systematic inspection of the various slaughter-houses which encircle our city, during the months of June, July and August. We found ten slaughter-houses in all, which can truly be said to surround our city, north, south, east and west.

These shops in point of perfection in construction and arrangements range from miserable to fairly good; in point of cleanliness, from filthy to fair; in point of humanity to the victims to be slain, from barbarous to fair. They are nearly all just outside the corporation limits, and some of them are two or three miles outside of the city limits. One is just inside the corporation line, while the majority are just beyond the boundary line of the city.

One of the omnipresent associates of each of these slaughter-houses is a pen of hogs, which are feasted on the blood, intestines, and other offal, which constitute their chief diet, and on which they live, grow and are fattened. I inquired occasionally if they fed their hogs corn for awhile before they were slaughtered, but received a negative answer.

One man said he never killed his hogs for home consumption, but sold them to be shipped East.

Just imagine the flavor of pork fattened on the offal of a butcher-shop, whose daily drink is blood, and whose diet is the entrails of their slaughtered companions.

You would all "gag" at the idea of eating dog meat, but will you tell me how much better in point of cleanliness and purity a hog is which is fattened on the poorest and foulest class of flesh imaginable than the carnivora whose nature it is to live on meat. Is it any wonder Germany has excluded the American hog from their markets? We are not here to condemn the hog that is fattened on corn and fares sumptuously on pure water every day, but the hog that quenches his thirst with blood and is fattened on spoiled meat and intestines is not fit for the use of man as an article of diet, in the humble opinion of the writer.

A huge pile of bones is another fragrant associate of the slaughter-houses with all their delicate and penetrating odors; while, as a rule, the floors of these houses were open and the blood, bloody water and other organic juices trickled down between the flooring and saturated the soil beneath, which in turn became one seething mass of putrefying corruption filled with offensive and obnoxious odors. Frequently we found baskets and boxes filled with spoilt hams, shoulders, side meat and other decaying flesh ornamenting different parts of the slaughter-house to aid in keeping up the fragrance of the room.

Now imagine a hog pen with all its natural odors, to which are added the fragrance of decomposing blood and flesh on one side, a pile of odoriferous bones on the other, and the soil underneath seething with putrefying organic matter, and the room itself ornamented with decaying meats, as were actually the facts in some of these shops, and then imagine such a place in which to kill and cool the animals from which you obtain your choice roasts and choice steaks, which must hang for hours in this fragrant atmosphere while cooling or awaiting transportation to the city, and you have a faint picture of the average butcher-shop of our city, and the atmosphere our meat enjoys prior to its journey to the frying-pan.

Its transportation from the slaughter-house to the meat market is no less romantic. Here it is dumped into a dirty, filthy, greasy, bloody, besmeared, stinking wagon box and covered with a dirty cloth that the meanest man in town would scorn to use as a horse-blanket, for the worst "crowbait" in the city; which is covered with blood and dirt; smells like a carrion and is little better, but is plenty good enough to cover the tender mutton or stall-fed beef on its way from the slaughter-house to the market.

Now, ladies and gentlemen, if you don't believe this, and think I am overdrawing the picture, go and see for yourselves, don't take my word for it, and I will guarantee that you will come back and say to me, "The half has not yet been told."

Beeves are shot in the country and hauled for hours in a wagon in the hot weather until I have seen them bloated up like a drum before they reach the slaughter-houses and are dressed. Does anyone imagine that adds to their delicacy or improves their flavor?

Under the present management of our butcher-shops, who knows what kind of animals are killed and supplied to our meat markets? Have we any guarantee that diseased hogs or cancerous beeves and consumptive sheep are not occasionally killed and sold to our people?

We know of two instances where certain parties tried to sell cancerous beef in this city, but were frustrated in their ends by the vigilance of our sanitary policeman. I know that consumption has existed among some of the flocks of sheep in our county. Who knows how many more such cases existed in the county, or how many of them were rushed into the market and sold to our people as "spring lamb." I have seen scores and scores of sheep livers from sheep that were slain for our markets literally covered with tubercles, and yet the mutton was sold just the same as though it came from the healthiest wether in the State of Ohio.

Who knows how many choleraied chickens and turkeys have found their way into our markets and been eaten by our people? The common "pudding meat" of our shops has an interesting history, surrounded with fragrance and tainted with romance. This delicate luxury is the child of the shop-soured scraps that have become unsalable, which are cooked up with, and not infrequently, the calves and sheep heads (the two latter with the brains and eyes also), until the bones can be shook out of them, when they are picked out and the meat is ground up and seasoned highly, so as to cover any tainted flavor it may have, and is then stuffed into skins, when it is ready for sale, and in this way an unpalatable, unmarketable batch of meat is made salable. Bologna sausage may be said to be just a grade above the former, but likewise is composed of shop-soured meat mixed with "blue meat," *i. e.*, old cows, and the like, that are too poor and tough to place on the market in any other shape.

When an accumulation of this is gathered up it is not unfrequently sent to a foundry on Fourth street, where it is ground by steam in an old, dirty, fly-covered cutting box, all gummed up with dried blood, fibrin and meat juices, whose fragrance is enough to entice the buzzards for miles around, but which is little better than some of the meat that is sent there to be ground; after this the meat pulp is highly seasoned; a little smoked bacon is sometimes cut up with it to give it a palatable flavor, when the whole mass is thoroughly mixed and stuffed in skins, smoked a little and placed on the market.

The average butcher sausage shares practically the same fate, and is usually made from stale pork and seasoned with sage and other condiments to cover its tainted taste and give it a degree of palatability.

Some of the firms have their own machinery and cut, mix and stuff their own pudding, bologna and sausage, but that is no guarantee that its quality is greatly improved thereby, except that it is not quite so public, and in some instances the machinery is kept more cleanly. They, no doubt, think where ignorance is bliss it is folly to be wise, on the part of the general public.

Few of the butchers of this city furnish their own "skins" for the sausage, bologna and the like, but purchase them from Chicago and other large cities. But you ask me what are "skins?" They are the small intestines of the beef, hog or sheep, usually the former, but seldom the latter, which are supposed to be cleaned by washing and scraping until all the mucous lining is removed and the "skin" is left clear and transparent

Those of us who were raised on the farm and enjoyed the rare luxury of cleaning hog "skins" on butchering day, can recall to memory this tedious process, which requires hours of diligent work, scraping each "skin" with a hickory scraper on a smooth oak shingle, inch by inch, until it would pass muster when "blowed up" by our mothers, who inspected them carefully to see that they were perfectly clear and transparent throughout, naturally become skeptical when we learn that these "skins" now-a-days are bought by the bushel, so to speak, in Chicago and other large cities, all cleaned and ready for use for a few cents a pound, and, as butchers have told me, for less than they can clean their own "skins," and then to look at these slimy coverings for our sausage and take a few sniffs of their fragrance before they are used, I am sure that but few of you will be able to suppress the feeling of skepticism as to their actual cleanliness.

The question now naturally arises, How are we to improve this state of affairs as regards the slaughter-houses of our city?

My reply is to establish an abattoir, which, in other words, is a city slaughter-house, owned, governed, controlled and run by the city, where all animals and fowls must be inspected before they are killed, and where all meat brought to the city must pass inspection before it is placed on sale in the city markets.

In this way you would only have, and only need to support one slaughter-house instead of ten. This could be made first-class in all its apartments from a sanitary and cleanly standpoint, as well as from a humane aspect. Ample yards, clean, healthy, comfortable stalls and coops should be supplied, where the animals and fowls can be properly cared for and fed and watered until inspected and slaughtered.

The building should be so constructed as to be always kept in a perfectly sanitary condition, as well as scrupulously clean. The floor should be made so it can be flushed and kept perfectly clean, and the blood and offal all cleaned up every day and properly cared for, which should be done by cremating it, or by using it for a fertilizer, but not by feeding a pen of pigs in an adjoining inclosure to the slaughter-house.

If it is used for feeding hogs at all, they should be kept far enough away from the slaughter-house not to taint the air under any circumstances, and hogs so raised should not be killed for pork until they have been fed for at least six or eight weeks on corn, oats or chop-feed, without the use of any offal whatever, before they are killed, and, even under these circumstances, I do not consider it economy or advisable to use the offal in this way, as it cannot be productive of the highest class of pork.

A competent butcher should be put in charge of this abattoir under the control and direction of the health department of the city, and be allowed such help as is necessary to do the requisite amount of work. A competent live stock and dressed meat inspector should be employed, who should inspect all the animals and fowls before they are slaughtered, and all the dressed or undressed meat of any kind before it is sold or placed on the market.

In this way, and after this manner only, can you expect to have the meat supply of our city regulated and feel reasonably certain of being supplied with good, healthy, wholesome, clean, fresh meat.

I have no doubt but what I will be censured for this report and these suggestions by some of my fellow-citizens, but I can assure you I have not made this to injure anyone, or interfere with his trade or daily income, but, on the contrary, to aid the butchers of our city by getting rid of their individual slaughter-shops and establish one central slaughtering place, kept under the control of the city, and run in such an economical manner as to just simply cost the actual expenses of the same, which will be much less than keeping up ten shops and as many butchers scattered all around our city; and not only that, but be able to insure the cleanliness as well as the healthy condition of the meat slaughtered and sold to the city at large.

This will in no way interfere with the meat markets or prevent any butcher from buying his own beeves, sheep or swine, but, instead of killing them himself, he takes them to the abattoir, where they are inspected, slaughtered, dressed and he charged with the actual expenses of the same, except the cost of inspection, which the city should pay.

All the rendering of lard and tallow, the making of sausage, bologna and pudding meat, and the curing of hams, bacon or dried beef should be done at the abattoir for each butcher, and delivered to him in proper condition at simply the cost of production.

No meat dressed outside the corporation limits should be allowed to be placed on the city markets before it is inspected and receives a clearance card from such officer. All fowls, whether dressed or alive, intended for the city markets, should pass through the abattoir and be inspected before being placed on sale, and when dressed for the city trade should be dressed at the abattoir and returned to the salesman or market place.

In Boston, where they established an abattoir in 1877, the clerk of the Board of Health of that city wrote me: "The establishment of the abattoir in this city removed from our midst a number of slaughter-houses that no effort of the Board of Health could prevent from being an offense to the public in their neighborhood. No complaint has been made against the abattoir since its establishment, and from frequent personal examinations it appears to be conducted with the care and vigilance all such institutions should be if they are to be a success, such as we believe ours to be."

I trust this report will be received in the spirit in which it is given, and not be construed as being intended in any way to injure the butchers of our city, either individually or collectively (who I have no reason to believe are any worse than those of other cities). To aver that I have scrupulously avoided anything personal in it, but have based it entirely on general information obtained from personal inspection, and whilst I have tried to guard the personal interests of all concerned. I have also endeavored to make a careful yet impartial inspection, and report and trust that it will finally result in the greatest good to the greatest number.

If our people are satisfied with the present manner our meat is prepared for the market, they have a right to say so; but if they are not, they have recourse by the establishing and maintaining of an abattoir.

CAPE FEAR RIVER QUARANTINE.

The Quarantine of the Cape Fear is under the control of the State, and what property appertains to it also belongs to the State. Under the management of Dr. W. G. Curtis, whose residence is at Southport, twenty-five miles below Wilmington, where the station is located, by dint of vigilance, firmness, and at times the practice of methods which belong to a passing period of quarantine service, he has succeeded in keeping our port free from importable pestilential diseases. He has been steadily sustained in his efforts by the two other members of the Quarantine Board, who reside in Wilmington. Fortunately for us, the tropics have been free from yellow fever for several seasons, and for the last two seasons the station has not been under a strain. In times of epidemic threatening, though, the practice at the quarantine is reduced nearly to a non-intercourse system, damaging to the trade of the port, but a necessity. Nearly every Southern port has been through the same trials as that of Wilmington, and, beginning with New Orleans, one by one, quarantine stations, upon a thorough scientific basis, have been established.

The quarantine outfit which has been adopted was conceived and put into practical operation by Dr. Joseph Holt, of New Orleans. After years of trial and improvements added to it, it has so far proved effectual, and has been adopted at the Southern quarantine refuges under the control of the U. S. Government.

An opportunity was recently afforded to the members of the North Carolina Board of Health (December 7, 1890), during the progress of the meeting of the American Public Health Association in Charleston, to inspect the workings of the Holt Apparatus. This Charleston Station is a duplicate of the Holt Apparatus at New Orleans, on a somewhat smaller scale, but with all the improvements which practice has suggested. We owe to the courtesy of the Charleston Board of Health, our opportunity for a thorough examination of the apparatus while at work. Being just such an outfit as the quarantine station at Southport must have, sooner or later, a description of it as given by Dr. H. B. Horlbeck, the efficient health officer of Charleston, is appended:

The Holt System of Maritime Sanitation in Charleston was initiated February 5th, 1890, on the Norwegian bark John Haussen. Ballast discharged, the vessel disinfected and fumigated.

The Charleston Quarantine Station is situated on the east end of James Island, on or near the site of Fort Johnson.

It is about three miles from Charleston, and is conveniently near to the track of vessels coming to the city.

It is provided with two wharves, affording mooring with twenty-two feet of water at low tide.

One of these warves is for unloading vessels having ballast, the other for vessels undergoing fumigation and disinfection. The rules governing quarantine require that all vessels with ballast from an infected or suspected port, shall have the same taken out and deposited at the station. This wharf is provided with a steam lift, which has a capacity of twenty tons an hour. The ballast is carried on cars specially constructed, on an iron rail track, to such point as is convenient to the station.

The wharf for vessels to be fumigated has a frontage of 200 feet. Along the entire front there is a 12-inch galvanized iron tube, connecting with the furnace, hereinafter described, to deliver sulphur dioxide gas; also it is provided with a 2-inch pipe connecting with the tank containing bi-chloride mercury solution.

The plant has given the fullest satisfaction.

The cylinder furnishes steam heat to any desired degree—240° being used.

The furnace on a recent occasion has given gas testing 18 per cent. dioxide of sulphur, and the mercury solution is used with ease and dispatch.

All clothing, bedding, hangings, mattresses, &c., are taken from vessels undergoing maritime sanitation and placed in a cylinder, and allowed to remain fifteen to twenty minutes, subjected to a temperature of 230° dry and moist heat, which, it is believed, thoroughly destroys all bacteria inimical to human life. The vessel is thoroughly washed down inside with bi-chloride of mercury solution (1 to 1,000 or 2,000, as necessary.)

After an entire cleaning up of the vessel the hatches are covered over and fumes containing 18 per cent. sulphur dioxide gas are forced in and the foul air driven out, until vessel is thoroughly filled up with the disinfecting medium. This is allowed to remain from twelve to twenty-four hours.

In case of decided infection or danger, the vessel and ship's company are kept at Quarantine for observation for five days after these processes are carried out.

In accordance with an invitation from Dr. C. P. Wilkinson, President of the Louisiana State Board of Health, two representatives of the Charleston Board of Health, (engaging the services of a draughtsman), visited New Orleans June 1st, 1889, the occasion being the opening and inspection of the New Orleans plant by the authorities of the State of Louisiana.

A careful study of their plant was made, and new plans were drawn out, from which the present plant was constructed.

A cylinder for dry and moist heat was made, thirty feet long by eight feet in diameter, constructed of ¼-inch flange steel, longitudinal seams double riveted, the heads being made hemispherical, and secured by eye-bolts and nuts, this plan being common to the Geneste & Hirscher, and the New Orleans disinfecting apparatus. A crane was also provided for swinging the movable head out of place. The cylinder is covered with hair felting and canvass to prevent radiation. A double track was made of 1½″x2½″ iron, suspended from top of, and running the whole length of cylinder, connecting by movable rails with an outside track suspended from the beams of the building.

On this track rolls a truck thirty feet long, made in sections, from which are suspended clothes racks; above the racks is a canvass cover to prevent any dripping of condensed steam, and beneath is a galvanized wire netting to catch any falling articles. Along the bottom of cylinder is laid a double manifold forming two pipes 4″ in diameter extending the whole length, connecting at the centre through bottom of cylinder with a T pipe. On the sides of this manifold are circular openings, 5″ centres, and with these openings connect 1½″ diameter pipe-coils, secured to manifold by collars on ends and nuts, these coils lining the inside of the cylinder. At the ends of manifolds are pipes fitted for drawing off the condensed steam; these pipes being laid along one side of manifold and passing back from ends to centre, where they connect with valves outside. There is also a perforated steam-pipe on opposite side manifold, entering at centre and passing towards both ends of cylinder for moist heat. Steam being admitted through the centre of the T pipe, passes into one-half of manifold, its whole length, thence through one end of coils (water passing out of ends of manifold), thence around coils and out of other half of manifold, making a complete circuit of coils, and perfect circulation. There is also a drain-pipe in bottom of cylinder near the centre.

The manifold and circulation are unlike the apparatus in New Orleans. The cylinder is provided with two weighted safety-valves set at ten pounds, also with steam-gauge and thermometers..

The fumigating apparatus consists of sulphur furnace composed of two pans made of cast iron three feet wide, five feet long, and four inches deep, bolted end to end, covered over top with three-sixteenth-inch plate forming a wagon top twenty-one inches above pans, having doors at end for charging with sulphur, provided with ventilators near the bottom. In the top of this cover at center is a 10-inch opening with curtains of sheet iron on either side dropping down to within four inches of the bottom of pans: connecting with this opening is a pipe leading down to within six inches of the bottom of the reservoir, made of ⅛-inch iron, thirty inches in diameter by five feet high, placed alongside. At the top of this reservoir is a second pipe leading to a No. 4 exhaust fan, and discharging into a 12-inch pipe of galvanized iron running to head of wharf, where, by suitable connections, it is led into hold of vessel. The pans rest on a brick foundation, forming a small furnace at one end (with doors for firing and controlling draught), from which fire and smoke pass under bottom of pan to the opposite end and thence to stack.

Upon suitable connections having been made with the vessel, by using asbestos twilled cloth pipes to allow for the rise and fall of tides, &c., a small fire is made under the pans, heating them up to 400°, or sufficient to ignite the sulphur ; this can be ascertained by occasionally throwing in small pieces of sulphur, care being taken not to heat the pans too hot, as this would sublime the sulphur. As soon as the proper heat is obtained the pans are charged with about one hundred pounds of sulphur each ; the fan started, drawing the fumes under the curtains, through the reservoir (there depositing any fire, and being partially cooled), thence through fan and forcing them through 12″ pipe to vessel. The fan being driven by a 5x7 centre crank engine.

Upon a tower thirty-five feet high is erected a wrought-iron tank ten feet in diameter by nine feet high, covered, and on the top of this cover a large sized spirit barrel is secured, having a plug in the bottom ; there is also a No. 4 brass-lined pump connecting with this tank to supply it with water ; pipes also lead from the tank to the head of wharf, where suitable connections are provided for hose. The mercury solution being deposited in barrel on top of tank is discharged into tank through plug in bottom where it is mixed with the water in the tank. One-inch four-ply rubber hose and nozzle are provided for conveying contents of tank from wharf connections into hold and vessel.

A forty horse-power return tubular boiler, set in brick work, supplies steam for cylinder, engine, and pump, the whole apparatus being contained in a building seventy-eight feet long by forty-one feet wide.

In applying the moist and dry heat to clothing, bedding, &c., the same is hung and laid on the racks, arranging them as openly as possible. Steam is then turned on to the coils for about fifteen minutes, expanding and driving the air out of the cylinder ; the racks are then drawn into the cylinder by a rope and pulley, the movable track removed and the head closed and secured. After the temperature has reached 180°–190°, F., of dry heat, the steam is turned into perforated pipes at the bottom of cylinder till it reaches a pressure of ten pounds. After a lapse of five minutes this pressure is turned off and applied again ; in so doing the air confined in pillows, mattresses, &c., is expanded, and by applying the heat a second time it penetrates to the center of the articles. After keeping this moist heat on for about fifteen minutes more it is allowed to escape, when the heat from coils will run the thermometer up to 230°–240°, F. The bolts in the head are then slackened and the vapor remaining in the cylinder allowed to escape. The head is then swung back ; the movable track replaced, and the racks run out, when everything will be found perfectly dry. No leather or rubber goods should be placed in the cylinder.

VACCINATION.

Neglect of Vaccination.—Americans, in general, trouble themselves but little with any means of prevention. It usually takes the costly routes of danger to impress them with the necessity of reform. It has been many years since small-pox was known in North Carolina. There is no compulsory vaccination law, in consequence, there may be found in every community young men and women who are not vaccinated. So widespread is this neglect that it frequently happens that applicants for life insurance, in many cases, get their initial vaccination before they can get their policy, for whatever estimate individuals may place upon the practice, these large corporations, who carry the lives of people for a money consideration, will take no risk upon a non-vaccinated man.

That the present condition of things is full of danger to the public health is readily seen by those who remember the great epidemics of a time past, but it is the younger generation who, having no instruction as to the danger of small-pox, and the protection which vaccination gives them, furnish in their persons the element of danger.

The Principles of Vaccination Should Be Taught in the Public Schools.—It has occurred to the teachers and superintendents to teach their pupils the evils of narcotics and alcoholic drinks; we deem it of the utmost importance that at suitable times, at least two or three times during a school session, the teacher should insist upon the necessity of a vaccination. He might enter into an explanation of what it was all for, what it has done in the past, and there are but few children who would not be interested in the historical sketch of the discovery. The State Board of Health has issued a pamphlet on *Vaccination*, stating in brief all that the teacher would be expected to teach his classes. These pamphlets will be distributed to public schools on requisition of the Superintendent of Public Instruction.

Vaccination Should Be a Prerequisite to Entrance into Public Schools.—Compulsory vaccination, like compulsory precautions of any sort, as soon as it takes a shape, arouses the innate perversity of our human nature, and as all North Carolinians are born with an innate bill of rights in their constitution, opposition to the practice would at once be begun. Even in Great Britain, where the supremacy of the law is so marked a characteristic, and where the law is executed with so little regard to persons, compulsory vaccination has given birth to an anti-vaccination party of formidable strength. Of course it would follow in North Carolina that opposition would take shape, and the beneficent ends aimed at would be very largely defeated. We believe, though, that the law could go so far as to require every child entering a public school to present a certificate of vaccination or be refused admittance to the school until so protected. Such a course, coupled with the instruction from the teachers on the subject, would go far to educate the entire community.

Fortunately the facilities for fresh supplies of vaccine are ample, and perhaps no epidemic of small-pox could be so great as to exhaust the supply of genuine material, but is it any part of wisdom, now that our risks are greatly increased by the multiplication of railroads, to wait until the danger is actually upon us before we take any steps to prepare for it?

Superintendents of Health are alert to these dangers, and know that they can get supplies at short notice from the office of the Secretary of the State Board, but they, with the co-operation of the physicians, are the only agencies for the protection of the people.

Small-Pox.—No case of small-pox has been imported into the State for the past two years, and our security against this importation is fortified by the system of interstate notification agreed upon by the National Conference of the State Boards of Health, a plan which, so far, has given satisfaction since its adoption.

VITAL STATISTICS.

The drudgery of vital statistics is out of all proportion to the great interest which, at times, individuals or communities attach to collected figures to prove or disprove the conditions of health and the disasters of mortality of their towns. No amount of labor would seem too great to the person who was seeking for information upon points regarding the health-rate and the death-rate of a place in which he desired to take up his residence, or to send his family or children. But the seekers after knowledge which statistics ought to furnish, are not the promoters of it, and such accumulations can only come by the steady systematic record of facts as they occur. To be of service, such statistics must be truthful, must be under the eye of a responsible officer, must be collected after a system designated by a central bureau. Experience shows that the habits of collecting and recording material, as required by the State Board of Health, is of slow growth. If the collector could have the same interest in the aggregate collection as the anxious enquirers have as to the finished product, the ends of the whole system would be accomplished with more satisfaction.

The State Board of Health has labored assiduously and patiently to inculcate a system of reports which would bring out the following facts:

The presence of diseases dangerous to the public health, such as diphtheria, typhoid fever, scarlet fever, small-pox, cholera, measles and consumption in the rural districts, with also the statement as to the presence of diseases among the domesticated animals. In the more thickly settled counties, the number of cases occurring was desirable, and, in spite of many difficulties, the Superintendents of Health in many counties have succeeded in getting approximate statements.

In the cities and towns the Board succeeded in getting reports of the deaths by months, and these reports are based, in the majority of cases, upon the records kept in the various towns requiring certificates of death for burial. While a lack of experience may tend to inaccuracy of these reports, it is believed that they are honestly compiled, the greatest discrepancy being in the estimation of population, the census of 1880 not being near enough for the latter half of the decade for most of the towns, and the census of 1890 being doubtful.

Such statistics as the Board could gather under rules adapted to the circumstances of our population as far as they could be devised, have merit enough to warrant their tabulation and publication in the *Bulletin of the North Carolina Board of Health.* The publication of such reports has had a good effect in stimulating the reporters to more interest in the work, and is believed to be the best way to train the reporters to their duties. The figures of every county are inspected by every other, and so, being open to the inspection of all, the figures given in our reports are becoming every year more useful, not only to ourselves, but to all the health officers and persons living out of the State who take an interest in such work. From the statistics appearing in the *Bulletin*, two sanitary publications of large circulation, issued in the city of New York, derive their information as to the mortality rate of our principal towns, giving wide circulation to the state of health of our population.

The Board recognizes the fact that our system is at present elementary, and, of necessity, it must remain in this state until far larger sums are devoted to the registration and collection of births, deaths and marriages. The time has not yet come in this State when we can expect to inaugurate a thorough scheme of vital statistics, nor is the great expense the principal obstacle. What efforts are now being made on a very economical scale are serving the very good purpose of education in the elements, and when the opportune time arrives, and the necessity is greater, we will be found better prepared to enter upon the task.

NOTIFICATION OF PESTILENTIAL DISEASES.

Although we cannot get a steady and accurate system of detailed reports from many counties to dignify with the name of statistics, we can get notification of pestilential diseases as they occur in any community. Every assurance is given to Superintendents of Health that upon the notification of an outbreak of a disease which they deem dangerous to the public health, that such case will be investigated and aid sent immediately. This really is the kind of security that is of more value to the people than any other, and ought to afford a certain degree of satisfaction. It all rests with the Superintendent of Health in making prompt report of the first outbreak of one of the diseases classified as pestilential.

REPORT OF TREASURER FOR TWO YEARS, ENDING DECEMBER 31, 1890.

1889.

January	2.	Express on printed matter	$ 35
"	2.	Postage	2 00
"	2.	S. G. Hall's bill	3 50
"	2.	C. W. Yates' bill	7 25
"	9.	Postage stamps	1 00
"	16.	Express on reports to Governor	50
"	18.	Postage stamps	50
"	21.	Express on *Bulletin*	55
"	21.	C. I. Comfort	10 00
"	22.	Postage stamps	1 00
"	30.	Subscription to *Sanitarian*	28 00
Feb'ry	5.	Express on matter from Raleigh	60
"	9.	Postage on *Bulletin*	24
"	9.	Express on matter from Raleigh	60
"	11.	Express on *Bulletin*	65
"	11.	Postage stamps	1 50
"	12.	A. B. Cook's bill	4 00
"	12.	Bausch & Lomb's bill	31 25
"	12.	Dr. T. F. Wood's expenses to Raleigh, meeting N. C. Board of Health	21 34
"	12.	Dr. R. H. Lewis' expenses to Raleigh, meeting N. C. Board of Health	8 85
"	12.	J. L. Ludlow, C. E., expenses to Raleigh, meeting N. C. Board of Health	24 45
"	12.	Dr. J. W. Jones' expenses to Raleigh, meeting N. C. Board of Health	25 00
"	12.	Dr. H. T. Bahnson's expenses to Raleigh, meeting N. C. Board of Health	25 65
"	12.	Dr. J. H. Tucker's expenses to Raleigh, meeting N. C. Board of Health	14 45
"	20.	Postage stamps	1 75
March	4.	Telegram to Montgomery, Ala	1 36
"	4.	Express on *Bulletin*	60
"	5.	Postage on *Bulletin*	62
"	6.	Postage stamps	1 65
"	15.	Dr. T. F. Wood's expenses to meeting of Quarantine Conference in Montgomery	60 25
"	20.	Freight and drayage	2 39
"	22.	Postage stamps	2 50

March	25.	A. B. Cook's bill	$ 25 00
"	27.	Postage stamps	1 00
"	31.	Salary of Secretary and Ass't for 3 months	300 00
April	4.	Postage stamps	1 00
"	6.	S. G. Hall's bill	3 25
"	6.	P. Blakiston, Son & Co.'s bill	9 00
"	6.	J. L. Ludlow, C. E., expenses to Quar. Conference	49 00
"	10.	Wilmington Paper Co.'s bill	9 00
"	10.	Freight and dray on books	1 00
"	13.	Telegram to Washington	40
"	15.	Dr. John McDonald, expenses to Raleigh meeting, February 6th	25 00
"	16.	Postage	2 00
"	17.	Post-office box rent	1 50
"	20.	Dr. T. F. Wood, expenses to meeting in Elizabeth City	38 75
"	20.	Postage	4 00
"	20.	Postage on *Bulletin*	40
"	22.	Express on *Bulletin*	85
"	22.	Dr. J. W. Jones, expenses to meeting in Elizabeth City	40 00
May	1.	Postage on *Bulletin*	31
"	3.	Postage stamps	4 75
"	18.	Wilmington Paper Co.'s bill	12 65
"	25.	Express on *Bulletin*	90
"	27.	Freight on books	3 50
"	29.	Postage stamps	2 00
June	4.	Postage stamps	1 00
"	10.	Drayage and freight on books	48
"	10.	Postage on *Bulletin*	51
"	20.	Postage stamps	95
"	29.	Postage on *Bulletin*	52
"	29.	Express from Raleigh	30
"	30.	Salary of Secretary and Ass't, 3 months	300 00
July	6.	Freight on books	1 89
"	20.	S. G. Hall's bill	3 50
"	30.	Post-office box rent	1 50
August	1.	Express on *Bulletin*	90
"	14.	Postage stamps	7 50
"	28.	Express on *Bulletin*, etc.	1 35
"	29.	Postage stamps	2 50
Sep'ber	14.	S. G. Hall's bill	2 00
"	27.	W. H. Green & Co.'s bill	3 20
"	27.	Express charges	75
"	30.	Salary of Secretary and Ass't, 3 months	300 00

October	31.	J. L. Ludlow, expenses to Elizabeth City and to Morganton on inspecting tour	$ 77 90
"	31.	Dr. H. T. Bahnson, expenses to Elizabeth City and to Morganton on inspecting tour	69 00
"	31.	Dr. T. F. Wood, expenses to A. P. H. Association in Brooklyn	52 40
"	31.	Subscription *American Weather*	2 00
Nov'm'r	2.	Express on *Bulletin*	60
"	23.	Postage stamps, and on *Bulletin*	1 63
Dec'ber	9.	Express on *Bulletin*	75
"	9.	Postage stamps	1 00
"	31.	Office rent for year 1889	60 00
"	31.	Salary of Secretary and Ass't, 3 months	300 00
		1890.	
January	10.	Postage stamps	$ 1 00
"	11.	Dr. J. A. Hodges, expenses to Morehead	21 00
"	16.	Subscription "Eng. & Build. Rec."	8 00
"	16.	" "Sanitarian"	28 00
"	20.	Postage on *Bulletin*	37
"	21.	Express on printed matter	40
"	27.	Dr. R. H. Lewis, expenses to meeting in Elizabeth City and trip to Morganton	35 00
"	27.	C. W. Yates' bill	17 00
Feb'ry	3.	Express on *Bulletin*	75
"	3.	Postage on *Bulletin*	37
March	4.	Express on *Bulletin*	75
"	4.	Postage on *Bulletin*	47
"	33.	Salary of Secretary and Assistant, three months	300 00
April	4.	Freight on *Bulletin*	74
"	4.	Post-office box rent	1 50
"	24.	Postage stamps	2 00
May	3.	S. G. Hall's bill	14 00
"	12.	Binding *Bulletin*	88
"	27.	Dr. R. H. Lewis, expenses to meeting in Oxford	22 00
"	27.	Dr. J. M. Hadley, investigation of epidemic of cerebro-spinal meningitis at Lagrange	10 10
"	27.	Dr. H. T. Bahnson, expenses to m't'g in Oxford	27 75
"	27.	Prof. F. P. Venable, " " "	11 20
"	27.	Dr. T. F. Wood, " " "	42 20
"	27.	Dr. R. D. Jewett, " " "	14 55
"	27.	Dr. J. M. Baker, " " "	30 50
June	14.	Postage stamps	1 00
"	27.	Dr. J. A. Hodges, expenses to meeting in Oxford	19 20
"	28.	Express on *Bulletin*	70
"	30.	Salary of Secretary and Ass't, 3 months	300 00

July	21.	G. P. Putnam's bill	$ 15 00
"	21.	Postage stamps	1 93
August	1.	Cyclostyle apparatus	5 50
"	1.	Express on above	65
"	1.	Express on *Bulletin*	70
"	1.	Postage on *Bulletin*	33
"	7.	C. I. Comfort, type-writer	67 50
Sep'ber	2.	Postage on *Bulletin*	36
"	3.	Cyclostyle roller	87
"	3.	Express on *Bulletin*	60
"	3.	Postage stamps	1 00
"	23.	Table	1 00
"	23.	Postage stamps	1 00
"	30.	Salary Secretary and Ass't, 3 months	300 00
October	17.	Express on transactions Conference State Board of Health	2 35
"	17.	Freight on stationery	1 00
Nov'm'r	7.	Blakiston's bill	3 74
"	7.	C. W. Yates' bill	23 08
"	7.	Express on *Bulletin*	70
"	7.	Postage stamps	1 70
"	7.	Postage on *Bulletin*	33
"	7.	Dr. J. M. Baker, expenses to Raleigh on Com. on Insane Asylum	26 00
"	27.	Prof. F. P. Venable for analyses	10 00
Dec'ber	8.	Express on stationery	1 00
"	10.	Postage on stationery to members	1 64
"	20.	Dr. H T. Bahnson, expenses to A. P. H. Association in Charleston	31 50
"	20.	Dr. R. H. Lewis, expenses to A. P. H. Association in Charleston	32 00
"	20.	Prof. F. P. Venable, expenses to A. P. H. Association in Charleston	28 35
"	20.	Dr. T. F. Wood, expenses to A. P. H. Association in Charleston	24 65
"	29.	Office rent for year 1890	60 00
"	31.	Salary of Secretary and Ass't, 3 months	300 00
		Balance on hand	176 52
		Total	$4,046 67

RECEIPTS.

Balance on hand January 1st, 1889	$ 46 67	
Appropriation for year 1889	2,000 00	
" " 1890	2,000 00	
		$4,046 67

TABLE III.—SHOWING THE COMPARATIVE PREVALENCE OF DISEASE DURING THE YEARS 1889 AND 1890.

(The top row of figures opposite each disease is for 1889; the bottom for 1890.)

DISEASES.	NUMBER OF COUNTIES REPORTING, BY MONTHS.											
	January.	February.	March.	April.	May.	June.	July.	August.	September	October.	November.	December.
Bronchitis	6	8	3	5	--	1	1	2	--	--	4	7
	11	5	8	3	--	--	--	1	2	4	6	6
Cholera (Asiatic)	--	--	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	1	--	--	--	--
Cholera (Chickens)	1	--	5	5	3	2	4	4	2	2	--	--
	--	1	1	3	6	4	1	1	1	--	--	1
Cholera (Hogs)	6	5	5	4	3	5	5	10	10	9	16	11
	3	2	2	3	2	1	2	4	--	5	4	1
Cholera Infantum	--	--	--	--	1	6	2	2	--	--	--	--
	--	--	--	--	--	2	2	3	--	--	--	--
Cholera Morbus	1	1	--	--	2	6	--	1	--	--	--	--
	--	--	--	--	2	4	--	--	--	--	--	--
Diarrhœa	2	--	--	5	22	20	--	--	--	--	--	--
	--	--	--	7	19	15	6	2	3	--	--	--
Diphtheria	6	4	4	2	2	2	4	11	14	17	11	9
	7	2	2	3	1	1	7	8	12	15	13	10
Distemper	--	1	2	3	2	1	1	1	1	--	1	4
	--	2	1	1	2	1	2	2	2	3	1	5
Dysentery	--	1	--	1	41	29	25	13	3	1	2	--
	3	3	4	20	36	18	7	2	6	4	1	--
Cerebro-spinal Meningitis	--	--	--	2	1	2	2	--	--	--	--	1
	--	--	--	1	1	--	--	--	--	1	--	--
Erysipelas	--	1	1	--	1	--	3	1	--	1	1	--
	1	--	2	--	--	--	--	1	--	1	--	--
Glanders	--	--	--	--	--	1	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--	--	--
Influenza or Catarrhal Fever ("La Grippe")	1	4	2	--	--	1	--	1	1	--	--	13
	44	45	38	13	1	--	--	1	1	8	7	3
Influenza (Dogs)	--	--	--	--	--	--	--	--	--	--	--	--
	1	--	--	--	--	--	--	--	--	--	--	--
Malarial Fever	5	4	5	5	12	15	25	16	27	21	7	4
	4	2	2	9	17	20	20	23	25	19	12	3
Malarial Fever, hæmorrhagic	--	--	--	--	--	--	--	--	3	1	2	--
	--	--	2	3	2	1	2	3	7	4	1	--
Malarial Fever, pernicious	--	--	--	1	--	--	--	--	1	--	2	1
	--	1	1	--	--	2	2	5	8	4	--	2
Measles	12	14	15	15	10	6	4	3	4	2	4	4
	5	6	11	15	16	19	9	13	13	8	8	10

TABLE III.—SHOWING THE COMPARATIVE PREVALENCE OF DISEASE DURING THE YEARS 1889 AND 1890.—*Continued.*

(The top row of figures opposite each disease is for 1889; the bottom for 1890.)

DISEASES.	NUMBER OF COUNTIES REPORTING, BY MONTHS.											
	January.	February.	March.	April.	May.	June.	July.	August.	September	October.	November.	December.
Meningitis	1	1	--	--	--	--	--	--	--	1	1	--
	--	--	--	2	--	--	--	2	1	--	--	1
Milk-sickness	--	--	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	1	--	--	--	--	--
Mumps	4	10	11	17	7	4	--	--	1	1	2	3
	4	--	8	6	6	--	1	3	2	1	1	2
Pneumonia	23	26	22	9	7	2	3	1	--	2	12	16
	21	15	25	17	5	2	--	1	3	4	8	16
Rheumatism	--	--	--	1	-	--	--	--	--	--	--	3
	2	4	3	2	3	--	--	1	1	1	1	1
Rubeola	--	--	--	--	--	--	--	--	--	--	--	--
	--	--	--	3	1	2	--	--	--	--	--	--
Scarlatina	1	2	--	2	2	1	1	2	2	4	4	3
	1	--	1	3	4	2	5	2	3	3	4	3
Scurvy	--	--	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	1	--	--	--	--	--	--
Staggers	--	--	--	--	1	--	1	3	5	2	--	--
	--	--	--	--	--	--	--	--	--	1	1	4
Tonsilitis	--	--	--	--	--	--	--	1	--	--	--	--
	--	--	--	--	--	--	--	2	1	1	--	1
Typhoid Fever	17	9	5	4	13	24	38	41	38	37	22	20
	13	6	12	13	17	33	40	37	37	30	31	19
Typho-malarial Fever	--	--	--	--	--	--	--	--	--	--	--	1
	--	--	--	--	--	4	5	7	1	--	1	--
Varicella	1	1	--	--	2	6	--	1	--	--	2	1
	2	--	--	1	2	4	--	--	--	--	--	1
Whooping-cough	6	6	6	6	8	6	9	7	7	8	7	6
	4	3	5	13	7	9	7	6	8	14	10	7

In the above table we have tried to show the comparative prevalence of diseases occurring in the State for two years. It will be seen from this table that the most prevalent diseases were *Diphtheria*, *Malarial Fever*, *Measles*, *Typhoid Fever* and *Whooping-cough*, these diseases having occurred in each month of the two years. Following these are Bronchitis, Dysentery, Mumps, Pneumonia and Scarlatina. *Bronchitis* is most prevalent in the winter months; *Diarrhœa* in the spring and early summer; *Diphtheria* in the fall; *Dysentery* in the spring and early summer; *Influenza* during the winter months of 1889-'90; *Malarial Fever* in the summer and early fall; *Measles* not much preference for any particular season, but a little more prevalent in the spring; *Mumps* in the spring; *Pneumonia* in the winter and early spring; *Scarlatina* but little influenced by the season; *Typhoid Fever* in the summer and autumn; *Whooping-cough* slightly more prevalent in the summer and autumn.

TABLE No. IV.—TABLE OF MORTUARY REPORTS FROM TOWNS FOR YEAR ENDING DECEMBER 31, 1889.

TOWNS AND REPORTERS.	Races.	DEATHS BY MONTHS—1889.														DEATH-RATE (ANNUAL) PER 1,000 BY MONTHS—1889.														POPULAT'N.	
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total by Races.	Grand Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total by Races.	For the year.	By races.	Total.
Asheville	W	2	10	9	7	5	5	9	5	5	7	7	3	74	138	3.4	17.1	15.4	12.0	8.6	8.6	15.4	8.6	8.6	12.0	12.0	5.1	10.6	13.8	7,000	10,000
Dr. H. B. Weaver	C	9	4	3	9	2	10	5	5	4	2	4	7	64		36.0	16.0	12.0	36.0	8.0	40.0	20.0	20.0	16.0	8.0	16.0	28.0	21.3		3,000	
Charlotte	W	9	12	15	9	a	7	9	10	15	13	6	3	108	11 mos.	18.0	24.0	30.0	18.0	a	14.0	18.0	20.0	30.0	26.0	12.0	6.0	19.6	23.4	6,000	11,000
Mr. J. Scarr	C	4	14	6	10		19	14	12	9	11	17	12	128	236	9.6	33.6	14.4	24.6		45.6	33.6	28.8	21.6	26.4	40.8	28.8	27.9		5,000	
Durham	W	3	1	1	1	7	5	3	6	3	5	0	3	38	88	8.0	2.7	2.7	2.7	12.0	13.3	8.0	16.0	8.0	13.3	0.0	8.0	8.4	11.0	4,500	8,000
Dr. N. M. Johnson	C	3	2	3	10	4	5	4	5	4	3	4	3	50		10.3	6.9	10.3	34.3	13.8	17.1	13.8	17.1	13.8	10.3	13.8	10.3	14.3		3,500	
Fayetteville	W	3	2	7	0	2	6	4	5	5	7	6	3	50	95	12.8	8.6	30.0	0.0	8.6	25.7	17.2	21.4	21.4	30.0	25.7	12.8	17.9	19.0	2,800	5,000
Dr. J. A. Hodges	C	1	5	3	3	2	3	3	4	3	12	4	2	45		5.5	27.3	16.4	16.4	10.9	16.4	16.4	21.8	16.4	65.4	21.8	10.9	20.4		2,200	
Goldsboro	W	3	4	1	a	1	4	6	7	4	1	2	2	35	11 mos.	12.8	17.2	4.3	a	4.3	17.2	25.7	30.0	17.2	4.3	8.6	8.6	13.6	12.0	2,800	5,000
Dr. W. H. Cobb, Jr.	C	1	3	0		2	4	5	5	2	0	0	0	22	57	5.5	16.4	0.0		10.9	21.8	27.3	27.3	10.9	0.0	0.0	0.0	10.9		2,200	
Oxford	W	1	a	a	a	5	4	2	2	3	0	0	3	20	9 mos.	7.5	a	a	a	37.5	30.0	15.0	15.0	22.5	0.0	0.0	22.5	16.6	18.2	1,600	3,300
D. J. M. Hays	C	2				0	2	2	7	1	4	4	3	25	45	14.1				0.0	14.1	14.1	49.4	7.0	28.2	28.2	21.1	19.6		1,700	
Raleigh	W	8	9	6	6	10	a	11	11	12	2	9	10	94	11 mos.	12.0	13.5	9.0	9.0	15.0	a	16.5	16.5	18.0	3.0	13.5	15.0	12.8	17.2	8,000	15,000
Dr. James McKee	C	13	19	15	16	11		15	14	13	10	3	14	143	237	22.3	32.6	25.7	27.4	18.9		25.7	24.0	22.3	17.1	5.1	24.0	22.3		7,000	
Salisbury	W	5	4	4	5	1	7	2	3	2	7	a	3	43	11 mos.	21.4	17.1	17.1	21.4	4.3	30.0	8.6	12.8	8.6	30.0	a	12.8	16.7	23.1	2,800	4,200
Dr. J. J. Summerell	C	3	4	3	2	1	10	7	9	2	3		2	46	89	25.7	34.3	25.7	17.1	8.6	85.7	60.0	77.1	17.1	25.7		17.1	35.9		1,400	
Tarboro	W	0	a	2	1	1	a	4	1	1	0	a	0	10	9 mos.	0.0	a	18.4	9.2	9.2	a	36.8	9.2	9.2	0.0	a	0.0	10.2	13.3	1,300	2,500
Dr. J. M. Baker	C	1		2	1	3		2	2	3	0		1	15	25	10.0		20.0	10.0	30.0		20.0	20.0	30.0	0.0		10.0	16.6		1,200	
Wilmington	W	12	5	6	13	7	18	10	11	12	18	9	13	134	476	16.0	6.6	8.0	17.3	9.3	24.0	13.2	14.7	16.0	24.0	12.0	17.3	14.9	20.7	9,000	23,000
Dr. F. W. Potter	C	20	16	28	16	22	44	39	34	41	16	27	39	342		17.1	13.7	24.0	13.7	18.8	37.7	33.4	29.1	35.1	13.7	23.1	33.4	24.4		14,000	

TABLE NO. IV—TABLE OF MORTUARY REPORTS, &C.—*Continued.*

TOWNS AND REPORTERS.	Races.	DEATHS BY MONTHS—1889.														DEATH-RATE (ANNUAL) per 1,000 BY MONTHS—1889.														POPULAT'N.	
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total by Races.	Grand Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total by Races.	For the year.	By Races.	Total.
Greensboro	W	*a*	3	1	0	2	*a*	1	1	1	0	2	3	14	10 mos. 31	*a*	9.0	3.0	0.0	6.0	*a*	3.0	3.0	3.0	0.0	6.0	9.0	4.2	6.2	4,000	6,000
Dr. E. R. Michaux	C		1	3	1	3		3	2	3	1	0	0	17			6.0	18.0	6.0	18.0		18.0	12.0	18.0	6.0	0.0	0.0	10.2		2,000	
New Berne	W	7	1	2	3	2	3	2	3	5	5	6	1	40	215	28 0	4.0	8.0	12.0	8.0	12.0	8.0	12.0	20.0	20.0	24.0	4 0	13.3	26.9	3,000	8,000
S. Fulcher, City Cl'k	C	13	9	9	18	16	7	12	20	20	24	15	12	175		31.2	21.6	21.6	43.2	38.4	16.8	28.8	48.0	48.0	57.6	36.0	28.8	38.3		5,000	
Henderson	W	2	0	3	1	3	2	2	2	0	1	0	0	16	47	13.4	0.0	20.1	6.7	20.1	13.4	13.4	13.4	0.0	6.7	0.0	0.0	8.9	13.4	1,785	3,500
Dr. A. Cheatham	C	3	3	1	5	5	5	2	3	1	1	0	2	31		20.9	20.9	7.0	35.0	35.0	35.0	14.0	20.9	7.0	7.0	0.0	14.0	18.1		1,715	
Statesville	W	*a*	*a*	*a*	2	4	1	2	1	1	2	2	*a*	15	8 mos. 24	*a*	*a*	*a*	13.7	13.7	6.9	6.9	20.6	6 9	6.9	6.9	*a*	----	10.3	------	3,500
Dr. M. W. Hill	C				2	0	1	0	5	1	0	0		9														----		------	

TABLE No. V.—TABLE OF MORTUARY REPORTS FROM TOWNS FOR YEAR ENDING DECEMBER 31, 1890.

TOWNS AND REPORTERS.	Races.	DEATHS BY MONTHS—1890.														DEATH-RATE (ANNUAL) PER 1,000 BY MONTHS—1890.												FOR YEAR.		POPULAT'N.	
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total by Races.	Grand Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	By Races.	Total.	By Races.	Total.
Asheville	W	2	5	5	7	8	4	12	8	9	9	7	4	80	166	3.4	8.6	8.6	12.0	13.7	6.8	20.6	13.7	15.4	15.4	12.0	6.8	11.4	16.6	7,000	10,000
Dr. H. B. Weaver	C	3	3	5	11	6	7	13	10	7	7	7	7	86		12.0	12.0	20.0	44.0	24.0	28.0	52.0	40.0	28.0	28.0	28.0	28.0	28.7		3,000	
Charlotte	W	7	1	10	8	12	8	4	8	6	8	7	9	88	259	12.0	1.7	17.2	13.7	20.6	13.7	6.8	13.7	10.3	13.7	12.0	15.4	12.6	19.9	7,000	13,000
Mr. J. Scarr	C	10	10	15	11	13	12	20	17	18	19	12	14	171		20.0	20.0	30.0	22.0	26.0	24.0	40.0	34.0	36.0	38.0	24.0	28.0	28.5		6,000	
Durham	W	1	*a*	5	2	3	2	3	3	3	2	2	0	26	62	3.0	*a*	15.0	6.0	9.0	6.0	9.0	9.0	9.0	6.0	6.0	0.0	7.0	9.7	4,000	7,000
Dr. N. M. Johnson	C	5		4	5	3	3	3	3	3	3	2	2	36		20.0		16.0	20.0	12.0	12.0	12.0	12.0	12.0	12.0	8.0	8.0	13.0		3,000	
Fayetteville	W	6	4	3	4	3	3	12	3	4	7	3	5	57	103	25.7	17.1	12.8	17.1	12.8	12.8	51.4	12.8	17.1	30.0	12.8	21.4	20.4	20.6	2,800	5,000
Dr. J. A. Hodges	C	5	5	3	4	3	3	0	4	5	7	4	3	46		27.2	27.2	16.8	21.8	16.8	16.8	0.0	21.8	27.2	38.2	21.8	16.8	20.9		2,200	
Goldsboro	W	2	5	3	2	2	2	7	2	4	6	4	0	39	54	9.6	24.0	14.4	9.6	9.6	9.6	33.6	9.6	19.2	28.8	19.2	0.0	15.6	10.8	2,500	5,000
Dr. W. H. Cobb, Jr.	C	2	2	0	2	0	2	2	2	0	3	0	0	15		9.6	9.6	0.0	9.6	0.0	9.6	9.6	9.6	0.0	14.4	0.0	0.0	6.0		2,500	
Henderson	W	*a*	*a*	*a*	*a*	2	0	0	0	1	0	3	*a*	6	21	*a*	*a*	*a*	*a*	10.6	0.0	0.0	0.0	5.3	0.0	15.9	*a*	4.8	8.4	2,256	4,256
Dr. A. Cheataam	C					2	2	3	3	3	1	1		15						12.0	12.0	18.0	18.0	18.0	6.0	6.0		12.5		2,000	
New Berne	W	6	3	0	5	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	14	56	20.6	10.3	0.0	17.1	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	12.0	16.8	3,500	10,000
S. Fulcher	C	9	18	6	9									42		16.6	33.2	11.0	16.6									19.4		6,500	
Oxford	W	1	2	0	4	*a*	0	*a*	*a*	1	1	*a*	1	10	43	7.0	14.0	0.0	28.1	*a*	0.0	*a*	*a*	7.0	7.0	*a*	7.0	8.8	19.4	1,700	3,300
Dr. J. M. Hays	C	5	11	3	7		1			2	2		2	33		37.5	83.0	22.5	52.5		7.5			15.0	15.0		15.0	30.6		1,600	
Raleigh	W	16	10	12	7	9	8	*a*	16	15	7	5	9	114	273	24.0	15.0	18.0	10.5	13.5	12.0	*a*	24.0	22.5	10.5	7.5	13.5	15.5	19.9	8,000	15,000
Dr. James McKee	C	14	21	11	9	22	25		15	10	13	8	11	159		24.0	36.0	18.9	15.4	37.7	42.9		25.7	17.1	22.3	13.7	18.9	24.7		7,000	
Salisbury	W	0	3	5	8	4	6	1	2	2	2	3	2	38	66	0.0	12.6	21.0	33.7	16.8	25.2	4.2	8.4	8.4	8.4	12.6	8.4	13.3	14.5	2,850	4,550
Dr. J. J. Summerell	C	3	2	1	4	1	8	1	4	1	0	1	2	28		21.2	14.1	7.0	28.2	7.0	56.4	7.0	28.2	7.0	0.0	7.0	14.1	16.5		1,700	
Wilmington	W	10	11	5	12	12	15	7	13	9	14	10	7	125	467	13.3	14.7	6.6	16.0	16.0	20.0	9.3	17.3	12.0	18.7	13.3	9.3	13.9	22.2	9,000	21,000
Dr. F. W. Potter	C	26	24	23	10	28	45	35	25	37	23	28	38	342		26.0	24.0	23.0	10.0	28.0	45.0	35.0	25.0	37.0	23.0	28.0	38.0	28.5		12,000	

TABLE NO. V.—TABLE OF MORTUARY REPORTS, &c.—*Continued.*

TOWNS AND REPORTERS.	Races.	DEATHS BY MONTHS—1890.														DEATH-RATE (ANNUAL) PER 1,000 BY MONTHS—1890.												FOR YEAR.		POPULAT'N.	
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total by Races.	Grand Total.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	By Races.	Total.	By Races.	Total.
Greensboro	W	2	5	2	3	2	3	3	3	2	3	2	1	31	39	6.0	15.0	6.0	9.0	6.0	9.0	9.0	9.0	6.0	9.0	6.0	3.0	7.7	6.5	4,000	6,000
Dr. E. R. Michaux	C	0	0	0	0	1	1	3	0	1	0	1	1	8		0.0	0.0	0.0	0.0	6.0	6.0	18.0	0.0	6.0	0.0	6.0	6.0	4.0		2,000	
Tarboro	W	*a*	1	0	0	0	3	2	4	2	0	2	*a*	14	29	*a*	9.2	0.0	0.0	0.0	27.6	18.4	36.9	18.4	0.0	18.4	*a*	13.0	14.0	1,300	2,500
Dr. J. M. Baker	C		0	1	0	1	3	1	2	1	3	3		15			0.0	10.0	0.0	10.0	30.0	10.0	20.0	10.0	30.0	30.0		15.0		1,200	
Warrenton	W	3	1	2	0	0	0	0	*a*	*a*	1	*a*	*a*	7	11	30.0	10.0	20.0	0 0	0.0	0.0	0.0	*a*	*a*	10.0	*a*	*a*	9.1	8.5	1,000	2,000
Dr. P. J. Macon	C	1	0	0	0	1	2	0			0			4		15.0	0.0	0.0	0.0	15.0	30.0	0.0			0.0			7.5		800	

TABLE No. VI.—SHOWING CAUSES OF DEATHS FOR YEAR ENDING DECEMBER 31, 1889.

TOWNS.	Races.	Typhoid Fever.	Scarlet Fever.	Malarial Fever.	Diphtheria.	Whooping cough	Measles.	Pneumonia.	Consumption.	Brain diseases.	Heart diseases.	Neurotic diseases.	Diarrhœal diseases.	All other.	Accident and violence.	Suicide.	Still-born.	TOTAL.		Under 5 years.	REMARKS.
																		Races.	Grand Total.		
Asheville	White	3	2	0	0	1	3	10	10	4	2	3	2	27	5	0	2	74	138	39	
	Color'd	0	0	0	0	0	0	3	11	3	1	1	0	40	0	0	5	64			
Charlotte	White	8	1	0	3	2	0	9	7	3	5	2	11	47	1	0	9	108	236	97	For 11 months; May omitted.
	Color'd	3	0	3	0	0	0	9	20	8	9	1	13	50	3	0	9	128			
Durham	White	2	0	1	1	0	0	1	7	0	2	0	8	6	1	0	9	38	88	38	
	Color'd	2	0	3	0	0	0	2	5	0	0	1	8	22	2	0	5	50			
Fayetteville	White	1	0	7	0	2	0	3	5	1	8	3	9	7	0	1	3	50	95	34	
	Color'd	1	0	5	0	6	4	3	9	0	1	4	8	1	3	0	0	45			
Goldsboro	White	2	0	1	0	0	0	3	1	3	5	0	7	10	0	2	1	35	57	12	For 11 months; April omitted.
	Color'd	0	0	2	0	0	0	2	4	0	1	0	7	6	0	0	0	22			
Henderson	White	0	0	0	0	0	0	1	1	5	0	0	4	5	0	0	0	16	47	16	
	Color'd	2	0	0	0	0	0	2	5	1	0	0	7	11	0	0	3	31			
New Berne	White	0	0	3	3	0	0	1	9	0	4	0	2	12	2	0	4	40	215	64	
	Color'd	1	0	30	1	1	0	7	26	2	9	8	6	63	2	2	17	175			
Oxford	White	4	0	0	1	0	0	1	3	0	0	3	0	7	0	0	1	20	45	11	For nine months; February, March and April omitted.
	Color'd	5	0	0	0	0	0	3	4	3	0	0	4	5	0	0	1	25			
Raleigh	White	3	0	0	1	0	2	2	4	3	3	1	2	68	1	0	4	94	237	45	For 11 months; June omitted. Three or four months, diseases were unclassified.
	Color'd	4	0	3	0	1	7	12	7	0	2	0	7	97	0	0	3	143			
Salisbury	White	1	1	0	2	0	0	0	4	2	3	0	8	17	3	0	2	43	89	14	For 11 months; November omitted.
	Color'd	4	0	0	0	0	0	8	6	1	1	1	6	19	0	0	0	46			
Wilmington	White	5	0	7	0	0	0	7	11	8	12	3	20	49	5	0	7	134	476	172	
	Color'd	7	1	17	1	0	0	17	62	12	19	24	29	111	13	2	27	342			

TABLE No. VI.—SHOWING CAUSES OF DEATHS FOR YEAR ENDING DECEMBER 31, 1889.—*Continued.*

TOWNS.	Races.	Typhoid Fever.	Scarlet Fever.	Malarial Fever.	Diphtheria.	Whooping cough	Measles.	Pneumonia.	Consumption.	Brain diseases.	Heart diseases.	Neurotic diseases.	Diarrhœal diseases.	All other.	Accident and violence.	Suicide.	Still-born.	TOTAL.		Under 5 years.	REMARKS.
																		Races.	Grand Total.		
Greensboro	White	0	0	0	1	0	0	1	4	1	3	0	2	2	0	0	0	14	31	4	For 10 months; January and June omitted.
	Color'd	0	0	0	0	0	0	0	10	2	4	1	0	0	0	0	0	17			
Tarboro	White	2	0	0	0	0	0	0	2	2	0	0	0	3	0	0	1	10	25	14	For 9 months; Februnry, June and November omitted.
	Color'd	1	0	0	0	0	0	0	3	1	1	0	0	5	2	0	2	15			
Statesville	White	2	0	0	1	0	0	2	4	0	1	0	1	2	1	0	1	15	24	----	For 8 months; January, February, March and December omitted—all the winter months.
	Color'd	0	0	0	0	0	0	0	2	0	0	0	0	7	0	0	0	9			
Total	White	33	4	19	13	5	5	41	72	32	48	15	76	263	19	3	44	691	1803	553	
	Color'd	30	1	63	2	8	11	68	174	33	48	40	95	437	25	4	72	1112			

TABLE SHOWING CAUSES OF DEATHS FOR YEAR ENDING DECEMBER 31, 1890.

TOWNS.	Races.	Typhoid Fever	Scarlet Fever.	Malarial Fever.	Diphtheria.	Whooping cough	Measles.	Pneumonia.	Consumption.	Brain diseases.	Heart diseases.	Neurotic diseases.	Diarrhœal Diseases.	All other diseases	Accident and violence.	Suicide.	Still-born.	TOTAL.		Under 5 years.	REMARKS.
																		By Races.	By Towns.		
Asheville	White	6	1	1	4	0	1	3	8	6	3	2	9	29	1	0	6	80	166	59	
	Color'd	5	0	1	0	1	0	19	10	5	5	0	6	35	2	0	5	86			
Charlotte	White	3	0	0	1	1	0	4	14	1	10	0	14	28	3	0	9	88	259	110	
	Color'd	11	0	3	0	2	0	7	38	5	11	0	20	55	3	0	16	171			
Durham	White	0	0	1	0	0	0	2	1	1	3	2	3	6	4	0	3	26	62	33	For 11 months; February omitted.
	Color'd	1	0	0	1	0	0	4	6	0	1	0	9	6	0	2	6	36			

Fayetteville	White	0	0	3	0	0	0	9	5	1	7	5	10	12	2	0	3	57	103	14	
	Color'd	0	0	4	0	3	1	5	9	0	0	3	11	6	0	0	4	46			
Goldsboro	White	3	0	3	0	0	0	4	5	1	7	0	6	7	1	0	2	39	54	12	
	Color'd	0	0	1	0	0	0	1	4	0	0	0	3	5	0	0	1	15			
Henderson	White	2	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2	6	21	5	For 7 months; January, February, March, April and December omitted.
	Color'd	3	0	0	0	0	0	0	2	0	1	0	3	4	1	0	1	15			
New Berne	White	0	0	0	0	0	0	1	4	0	1	0	0	5	2	1	0	14	56	18	For 4 months only; last 8 omitted.
	Color'd	0	0	4	0	0	0	2	1	0	1	2	2	25	0	1	4	42			
Oxford	White	0	0	0	0	0	0	1	0	1	1	1	0	5	0	1	0	10	43	10	For 8 months; May, July, August and November omitted.
	Color'd	1	0	0	0	1	0	6	5	0	2	2	0	14	1	0	1	33			
Raleigh	White	4	0	2	0	0	0	13	8	8	7	2	13	49	2	0	6	114	273	89	For 11 months; July omitted; several months unclassified.
	Color'd	8	0	3	1	0	0	17	17	2	10	1	10	77	1	0	12	159			
Salisbury	White	3	0	0	1	0	1	3	4	7	1	0	8	8	1	1	0	38	66	16	
	Color'd	5	0	0	1	0	0	3	5	0	2	0	1	11	0	0	0	28			
Wilmington	White	6	0	6	2	0	0	5	16	8	7	10	14	42	5	1	3	125	467	178	
	Color'd	7	0	14	0	0	0	18	50	9	20	25	32	125	6	1	35	342			
Greensboro	White	2	0	0	0	0	0	3	4	0	3	0	2	12	2	0	3	31	39	7	
	Color'd	1	0	0	0	0	0	0	0	0	1	0	1	4	1	0	0	8			
Tarboro	White	2	0	0	2	0	0	0	2	1	2	0	1	2	0	1	1	14	29	6	For 10 months; January and December omitted.
	Color'd	3	0	0	0	0	0	0	2	0	2	0	0	6	1	0	1	15			
Warrenton	White	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	2	7	11	2	For 8 months; August, September, November and December omitted.
	Color'd	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4			
Total	White	31	1	16	10	1	2	49	71	35	52	22	81	210	23	5	40	649	1649	559	
	Color'd	46	0	30	3	7	1	73	150	21	56	33	98	376	16	4	86	1000			

In the above table, showing the causes of death for the year 1889, there appear 691 deaths among the whites and 1,112 among negroes, making a total of 1,803 deaths in the fourteen towns included in the table.

Typhoid fever	caused	death of	33	white	and	30	colored;	total	66
Scarlet fever	"	"	4	"	"	1	"	"	5
Malarial fever	"	"	19	"	"	63	"	"	82
Diphtheria	"	"	13	"	"	2	"	"	15
Whooping-cough	"	"	5	"	"	8	"	"	13
Measles	"	"	5	"	"	11	"	"	16
Pneumonia	"	"	41	"	"	68	"	"	109
Consumption	"	"	72	"	"	174	"	"	246
Brain diseases	"	"	32	"	"	33	"	"	65
Heart diseases	"	"	48	"	"	48	"	"	96
Neurotic diseases	"	"	15	"	"	41	"	"	56
Diarrhœal diseases	"	"	76	"	"	95	"	"	171
All other diseases	"	"	262	"	"	437	"	"	699
Accident and violence	"	"	19	"	"	25	"	"	44
Suicide	"	"	3	"	"	4	"	"	7
Still-births	"	"	44	"	"	72	"	"	116
			691			1,182			1,803

Deducting from this number the last three items, it leaves 625 whites and 1,011 colored, a total of 1,636 deaths from actual disease during the year in these towns with an estimated population of 56,585 whites and 51,415 colored, a total of 108,000. This would make the total death-rate from disease for the year 15.1 in each thousand of population; but the death-rate is higher than this, for, under the head of remarks, it will be seen that from only six of these towns were reports received for the entire year, the other eight towns omitting from one to four months.

In the table showing causes of deaths in the year 1890 in the towns reporting, there appear 1,649 deaths—649 whites and 1,000 colored.

Typhoid fever	caused	death	of 31	whites	and	46	colored;	total	77
Scarlet fever	“	“	1	“	“	0	“	“	1
Malarial fever	“	“	16	“	“	30	“	“	46
Diphtheria	“	“	10	“	“	3	“	“	13
Whooping-cough	“	“	1	“	“	7	“	“	8
Measles	“	“	2	“	“	1	“	“	3
Pneumonia	“	“	49	“	“	73	“	“	122
Consumption	“	“	71	“	“	150	“	“	221
Brain diseases	“	“	35	“	“	21	“	“	56
Heart diseases	“	“	52	“	“	56	“	“	108
Neurotic diseases	“	“	22	“	“	33	“	“	55
Diarrhœal diseases	“	“	81	“	“	98	“	“	179
All other diseases	“	“	210	“	“	376	“	“	586
Accident and violence	“	“	23	“	“	16	“	“	39
Suicide	“	“	5	“	“	4	“	“	9
Still-births	“	“	40	“	“	86	“	“	126
			649			1,000			1,649

Deducting from this number, 174, the sum of the last three items, which are not diseases, there remain 1,475 (581 white and 894 colored) deaths from disease occurring in these thirteen towns with a claimed aggregate population of 108,606—whites 57,106 and colored 51,500. But this is not the actual number of deaths during the year in these towns, for there have been many failures to send monthly reports.

It is to be regretted that there is no way of insuring an accurate and reliable return of all the deaths occurring in towns of one thousand population; or, at any rate, from all such as have a population as great as two thousand. There are only three or four towns in the State that have ordinances requiring the registration of every death, with a certificate from a physician showing the cause of death, before a burial permit may be issued. We question the accuracy of some of the returns in the accompanying tables, on account of the laxity of the laws on the subject. To be of value, statistics must be reliable and accurate. That the beneficent effects of modern sanitation may be made evident to the public, it must be done by a comparison of the death-rate of the town before and after the sanitary measures are instituted. But if before these measures are instituted the deaths are not carefully reported, the death-rate before may *appear* less than that after, because before all the deaths were not recorded while afterwards they were.

Another important step would be to have a record of the ages at which deaths occur, for if, after a lapse of a few years, the average time of death be advanced two or three years, it would be to the credit of sanitation that it had added these two or three years to each of the lives of as many persons as had died. Suppose, for instance, the deaths in 1890 were at an average age of forty years, while those in 1889 were at thirty-nine years. This would show, if the deaths were the same, a saving of 1,803 years, and this of adult life, too, to the State, an equivalent of about forty-five lives. In this way it can plainly be seen that, even if the actual death-rate be the same, if the average age of death be advanced, or, in other words, the length of life of our people be increased by one year, much good has been accomplished. But this cannot be shown unless the ages of persons dying be recorded.

COMPARATIVE CONDITION OF PUBLIC BUILDINGS.

In March, 1890, a letter was sent from this office to each Superintendent of Health, asking him to state what improvements had been made in the jails and poor-houses of their respective counties since the organization of their county board of health. As one of the principal works the State Board laid out for itself was the improvement of the condition of jails and poor-houses, some of which were a disgrace to Christian civilization, it is with a feeling of much satisfaction that we call especial attention to the following table, which gives the condition of these institutions at the time of the first report of the Superintendent, the condition at the time of the report sent in in April, and the improvements instituted during the interval.

A general review of this table shows that in these counties there have been built twelve new jails, most of them being furnished with all the modern improvements, and the material, in most cases, being brick; also ten new poor-houses and five hospitals at poor-houses for the sick or insane. Twenty-six counties have had repairs and additions made at jail and poor-house, while nearly all report greater attention to cleanliness and sanitation generally.

TABLE VI.—SHOWING THE COMPARATIVE CONDITION OF PUBLIC BUILDINGS IN THE COUNTIES HAVING ORGANIZED BOARDS OF HEALTH, AT TIME OF FIRST REPORT AND ON MARCH 31, 1890.

COUNTIES.	Sup't of Health (at last Report).	Date of First Report.	Condition of Buildings at Time of First Report.	Condition of Buildings March 31, 1890.	Improvements made since Organization of Board of Health.
Alamance	Dr. Geo. W. Long, Graham.	July, 1887	Food at jail and poor-house not as varied as it sh'd be.	Good condition, except jail.	A new work-house has been erected.
Alexander	Dr. McD. Little, Taylorsville.	August, 1887	Improvements needed at poor-house.	As good as nature of buildings will admit.	Two new rooms added to poor-house.
Alleghany	Dr. George Doughton, Sparta.	March, 1889	Pretty good	As good as their construction will admit of.	Some repairs on jail.
Beaufort	Dr. W. A. Blount, Washington.	January, 1888	Well kept and inmates well cared for.	Jail is overcrowded; poor-house clean and well kept.	Very greatly improved in every comfort and convenience; well warmed and thoroughly ventilated; inmates have good bedding and ample clothing.
Bertie	Dr. H. V. Dunston, Windsor.	March, 1889	Fairly good; improvements made as needed.	Good	(No organization of Board of Health).
Bladen	Dr. N. Robinson, Elizabethtown.	September, '89	Good	Good	None.
Buncombe	Dr. H. B. Weaver, Asheville.	March, 1886	New jail; new buildings in course of erection for the poor.	Good	A good, new poor-house and a new brick jail, with spacious cells and sanitary improvements, have been built.
Burke	Dr. J. L. Laxton, Morganton.	May, 1886	Good	Jail not in good condition, and Comm'rs will not make it better.	Poor-house has been greatly improved, and is comfortable and well ventilated.
Cabarrus	Dr. R. S. Young, Concord.	June, 1886	Jail extremely bad; improvements expected.	Good	Hospital built at poor-house; new furnace put in jail.
Caldwell	Dr. A. A. Kent, Lenoir.	December, '87	Reasonably comfortable; condition of paupers not so good as it should be.	Rather bad, with no efforts to improve it.	None at poor-house; some minor repairs at jail, giving increased space.

Carteret	Dr. M. F. Arendell, Morehead City.	May, 1888	Nice and clean; have been much improved.	Old buildings, but clean and comfortable.	None.
Caswell	Dr. R. H. Williamson, Yanceyville.	January, 1888	Poor-house good; jail not so good.	Good; that of jail improved by new heating apparatus.	Repairs to poor-house; improvement in heating apparatus in jail.
Catawba	Dr. J. M. McCorkle, Newton.	April, 1886	Good; improvements just completed.	Good	Only an extensive addition to court-house; new jail to be built soon as finances will permit.
Chatham	Dr. L. A. Hanks, Pittsboro.	March, 1886	Good condition; heating of jail not sufficient.	Very good.	
Cherokee	Dr. J. F. Abernathy, Murphy.	April, 1886	Good	Poor sewerage at jail; others good.	New jail built; bids are in for a new court-house.
Chowan	Dr. R. W. Winborne, Barnitz.	June, 1889	Poor-house, very good; jail, tolerable good, hope for improvement soon.	Buildings kept clean and inmates well cared for.	Nothing noteworthy at poor-house; jail has been made more secure; new buildings were erected at poor-house just before Board was organized (April, 1889).
Cleveland	Dr. O. P. Gardner, Shelby.	May, 1886	Well kept	Some improvements have been made to jail.	Jail considerably improved; a convenient and substantial brick house has been built for the poor; cost $7,000.
Columbus	Dr. Isaac Jackson, Whiteville.	March, 1886	Jail not sufficiently heated; Poor-house buildings inadequate.	Good; new hospital just finished.	Court-house thoroughly repaired; jail repaired and painted; a large, airy and comfortable hospital built at poor-house.
Craven	Dr. Leinster Duffy, New Berne.	June, 1889	Jail and poor-house well-kept, recently cleaned and whitewashed.	Good	None, except greater cleanliness and improved ventilation at jail.
Cumberland	Dr. J. A. Hodges, Fayetteville	March, 1886	Buildings in good condition and well kept.	First-cl's; recently cl'ned and whitewashed.	Furnace and heater at poor-house: ventilatian of jail improved.
Davidson	Dr. R. L. Payne, Jr., Lexington.	March, 1886	Excellent	Fairly good	None, except in the matter of cleanliness; improvement in the diet of paupers and a great lowering in the death-rate; food was formerly fat bacon, flour and salt; now it is varied to suit individual needs.

TABLE VI.—SHOWING THE COMPARATIVE CONDITION OF PUBLIC BUILDINGS, &c.—*Continued.*

COUNTIES.	Sup't of Health (at last Report.	Date of First Report.	Condition of Buildings at Time of First Report.	Condition of Buildings March 31, 1890.	Improvements made since Organization of Board of Health.
Duplin	Dr. James W. Blount, Kenansville.	December, '86	Good except jail, which is deficient in sewerage.	Poor-house is in good condition.	None, except general repairs; more attention to sanitary rules, cleanliness and the removal of filth and garbage.
Durham	Dr. N. M. Johnson, Durham.	March, 1886	Work-house overcrowded.	Good, except some slight defects in drainage, which are being remedied.	New court-house built, and its drainage and ventilation afterwards improved; sewerage at jail made good.
Edgecombe	Dr. J. M. Baker, Tarboro.	April, 1886	Excellent	Good	New jail with latest sanitary improvements; new city-hall with well-arranged calaboose.
Forsyth	Dr. D. N. Dalton, Winston.	March, 1886	Very bad; bad sewerage; bad ventilation; overcrowded.	Good	Building of a $15,000 jail, with all modern improvements; quite a neat asylum for the chronic insane of the county.
Franklin	Dr. E. S. Foster, Louisburg.	March, 1886	Good	Good	A system of sewerage to jail, besides iron cages, has been placed in jail, adding to comfort and security of prisoners.
Gaston	Dr. E. B. Holland, Dallas.	March, 1886	Jail a failure for want of ventilation and warming.	Good	Jail has been enlarged, and means for heating and ventilating improved.
Granville	Dr. J. M. Hays, Oxford.	February, 1888.	Jail is new.	Good	None, except that greater cleanliness is required.
Greene	Dr. E. H. Sugg, Snow Hill.	April, 1886	Good; poor-house not well located.	Good	A new poor-house has been built.
Guilford	Dr. E. R. Michaux, Greensboro.	March, 1886	Jail overcrowded; poor-house in good condition.	Good	Improvements to court-house; nothing else except the cleaning and disinfecting of poor-house from time to time.

Halifax	Dr. A. B. Pierce, Weldon.	February, 1890	Good; improvements at poor-house contemplated.	Good; improvements at poor-house contemplated.	An asylum for the insane, with four rooms, has been added.
Haywood	Dr. R. L. Allen, Waynesville.	February, 1887	Good	No report for several months.	None, except to whitewash jail.
Henderson	Dr. W. B. Reese, Hendersonville.	April, 1886	Pretty good	Very good	A new wooden poor-house built; jail of rock and brick in course of construction.
Iredell	Dr. M. W. Hill, Statesville.	April, 1886	Pretty fair	Not in good condition; no efforts to improve it.	None at all.
Johnston	Dr. L. L. Sasser, Smithfield.	March, 1886	Jail not good, being improved; poor-house, good condition.	Good	Poor-house enlarged and all the buildings plastered; jail has been fitted up with steel cells and water-system to flood privy vaults, etc.
Jones	Dr. C. B. Woodley, Trenton.	April, 1886	Jail excellent; poor-house not so good, but fair.	Good	None, except necessary repairs.
Lincoln	Dr. W. L. Crouse, Lincolnton.	April, 1886	Not attractive in appearance; poor-house is a small wooden structure.	Good, except poor-house is too small.	New buildings erected at poor-house, and the building kept whitewashed and more cleanly altogether.
Macon	Dr. J. M. Lyle, Franklin.	March, 1886	Good; no improvements needed.	Good	Improvement in general cleanliness in and around all buildings.
Madison	Dr. J. K. Hardwicke, Marshall.	March, 1886	Good	Good	Jail repaired and two rooms added; new poor-house built.
Martin	Dr. W. H. Harrell, Williamston.				Entirely new jail and court-house; steel cells at jail; nothing at poor-house.
McDowell	Dr. J. H. Gilkey, Marion.	March, 1886	Fair; trying to improve them.	Good; accommodation very inadequate.	None, but an additional building at poor-house.
Mitchell	Dr. W. P. Upton, Bakersville.	September, '89	Poor-house good; jail not so good; nothing doing to improve it.	Good, except jail	None, so far, but efforts are being made to improve jail.

TABLE VI—SHOWING THE COMPARATIVE CONDITION OF PUBLIC BUILDINGS, &c.—*Continued.*

COUNTIES.	Sup't of Health (at last Report).	Date of First Report.	Condition of Buildings at Time of First Report.	Condition of Buildings March 31, 1890.	Improvements made since Organization of Board of Health.
Moore	Dr. Gilbert McLeod, Carthage.	November, '89	Jail good; some repairs have been made at poor-house; more needed.	Will be made good at once.	General cleaning up at jail, and improvement of sanitary condition; new court-house nearing completion, cost $15,000; nothing yet at poor-house; no organized Board of Health yet.
New Hanover	Dr. F. W. Potter, Wilmington.	March, 1886	Jail burned; poor-house in good condition.	Jail good; poor-house just burned.	New brick jail to replace one burned; repairs, as required, were put on poor-house.
Northampton	Dr. H. W. Lewis, Jackson.	May, 1886	Poor-house in good condition.	Good; improvements going on at poor-house.	Poor-house much improved; cabins ceiled; large, comfortable house built for pauper insane with water trapped privies, etc.; well ventilated and heated.
Orange	Dr. D. C Parris, Hillsboro.	February, 1889	Good; dietary at poor-house not good nor varied enough.	Jail not in good condition; other buildings good.	Court-hall entirely remodeled and improved, Mayor's office added; jail re-covered and other changes made; many repairs and changes at poor-house.
Pender	Dr. S. S. Satchwell, Burgaw.	March, 1886	No jail or poor-house.	Good	An elegant new court-house has been built; also a new jail with all modern improvements for health and comfort (there were none before); poor-house instituted, and a new one about to be built.
Pitt	Dr. F. W. Brown, Greenville.	April, 1886	Jail well ventilated; built of brick; iron cages.	No report for several months.	
Randolph	Dr. J. W. Long, Randleman.	June, 1889	Good, and well kept	Poor-house overcrowded; jail needs better means for drainage from cells.	None have been made, but striving for some at poor-house with good prospects for success.

Richmond	Dr. R. W. Stancill, Rockingham.	March, 1886	Good	Good.	
Robeson	Dr. R. F. Lewis, Lumberton.	March, 1886	Fair; improvements contemplated.	Only fair; improvements suggested.	Some improvements every year.
Rowan	Dr. J. J. Summerell, Salisbury.	March, 1886	Jail improved; sewerage still defective.	Good	Old poor-house replaced by a better one; a comfortable wash-house built; sanitary condition of jail much improved by the introduction of water and sewerage.
Rutherford	Dr. E. B. Harris, Rutherfordton.	April, 1886	Pretty good	Good	Jail recciled and re-covered; poor-house grounds cleaned up and shade.trees planted.
Sampson	Dr. J. A. Stevens, Clinton.	March, 1886	New poor-house; just completed.	Good.	
Swain	Dr. R. L. Davis, Bryson City.	October, 1886	Jail very unsanitary; no poor-house.	Fairly good	None.
Transylvania	Dr. D. H. Farmer, Brevard.	January, 1887	Excellent	Good	Two cottages, two rooms each, added to poor-house.
Tyrrell	Dr. Ab. Alexander, Columbia.	March, 1886	Jail burned	Good	A new jail has been built.
Union	Dr. W. C. Ramsay, Monroe.	April, 1886	Poor-house excellent; jail bad.	Poor-house good; jail bad; steps taken toward building a new one.	New poor-house built, which is roomy and comfortable.
Vance	Dr. A Cheatham, Henderson.	March, 1886	No jail or poor-house.	Good	Jail and poor-house have been established.
Wake	Dr. James McKee, Raleigh.	June, 1886	Good; inmates of house of correction have 108 cubic feet of space each.	Good.	
Warren	Dr. P. J. Macon, Warrenton.	April, 1886	First-class	Very good	Buildings at poor-house have been plastered; are white-washed twice a year; a stone building (2 rooms) built for unruly inmates.

TABLE VI—SHOWING THE COMPARATIVE CONDITION OF PUBLIC BUILDINGS, &c.—*Continued.*

COUNTIES.	Sup't of Health (at last Report).	Date of First Report.	Condition of Buildings at Time of First Report.	Condition of Buildings March 31, 1890.	Improvements made since Organization of Board of Health.
Watauga	Dr. W. B. Councill, Boone.	March, 1886	Poor-house good; jail badly located and unhealthy.	Good; new jail just finished.	New jail built with modern improvements; as to health and sanitary conditon, poor-house has been improved in every way.
Wayne	Dr. W. H. Cobb, Jr., Goldsboro.	March, 1886	Jail shameful beyond excuse.	Good	Jail supplied with steel cells and improved generally; poor-house enlarged from one to four buildings; all rooms lathed and plastered and containing a fire-place.
Wilson	Dr. R. W. King, Wilson.	September, '86	Good	Good	Introduction of steel cells in jail and more attention to sanitary condition; improvements contemplated at poor-house.
Yadkin	Dr. T. R. Harding, Yadkinsville.	November, '89	Jail not first-rate; poor-house good.	Jail in bad condition; poor-house fair.	None to poor-house; jail has been disinfected and some work done, but our County Commissioners are not disposed to spend money for the comfort or health of prisoners or paupers.
Yancey	Dr. J. L. Ray, Burnsville.	September, '86	Would be better for cleaning; poor in the care of private individuals.	Jail not kept very clean, but will be improved soon.	Nothing but necessary repairs; have no poor-house; arrangements made with a private family to take care of poor; none have gone there yet.

TABLE VII. — MORTUARY STATISTICS OF JAILS AND POOR-HOUSES FOR YEAR ENDING MARCH 31, 1890.

COUNTIES.	JAIL.		POOR-HOUSE.	
	Average Monthly Census.	No. deaths for year.	Average Monthly Census.	No. deaths for year.
Alamance	(11 mos.) 6½	-	28½	6
Alexander	(6 mos.) 3	--	7	4
Alleghany	(9 mos.) 3	--	1⅓	--
Ashe	(5 mos.) 5½	--	8½	--
Beaufort	(7 mos.) 7½	--	13	4
Bertie	(10 mos.) 2½	--	11½	2
Bladen	(6 mos.) 2	1	6	2
Brunswick	(5 mos.) 3½	--	10	6
Buncombe	(12 mos.) 12½	--	30	--
Burke	------------	(Lynched) 2	----	2
Cabarrus	(10 mos.) 7½	1	21½	8
Caldwell	(12 mos.) 4	--	8	2
Camden	------------	--	----	--
Carteret	(11 mos.) 2	--	----	--
Caswell	(12 mos.) 3	--	23	3
Catawba	(8 mos.) 6½	1	30	1
Chatham	(12 mos.) 3	--	20	--
Cherokee	(11 mos.) 4½	--	1½	--
Chowan	(10 mos.) 3	--	6	3
Cleveland	(10 mos.) 9½	--	35	2
Columbus	(12 mos.) 5½	--	7	2
Craven	(10 mos.) 19½	--	24	16
Cumberland	(12 mos.) 11	--	16	6
Currituck	------------	--	----	--
Davidson	(12 mos.) 6	--	21½	2
Duplin	------------	--	23	3
Durham	(11 mos.) 8½	--	15½	3
Edgecombe	(10 mos.) 12	--	32½	12
Forsyth	(8 mos.) 22½	(Shot) 2	19	12
Franklin	(12 mos.) 5	--	19½	2
Gaston	(11 mos.) 5½	--	15½	7
Granville	(10 mos.) 9½	--	21½	10
Greene	(11 mos.) 3½	--	11½	2
Guilford	(12 mos.) 15	--	---	4
Halifax	(2 mos.) 8½	2	51	15
Haywood	------------	--	--	--
Henderson	(10 mos.) 7½	--	3	--
Hyde	------------	--	----	--
Iredell	(11 mos.) 15	--	19½	5
Jackson	(9 mos.) 4	--	4	--
Johnston	(12 mos.) 6	--	17½	6
Jones	(10 mos.) 1½	--	5	2

TABLE VII. — MORTUARY STATISTICS OF JAILS AND POOR-HOUSES FOR YEAR ENDING MARCH 31, 1890.—*Continued.*

COUNTIES.	JAIL.		POOR-HOUSE.	
	Average Monthly Census.	No. deaths for year.	Average. Monthly Census.	No. deaths for year.
Lincoln	(11 mos.) 7½	--	30	2
Macon	(11 mos.) 4	--	----	--
Madison	(10 mos.) 5½	--	5½	2
Martin	(7 mos.) 5½	--	14	4
McDowell	(12 mos.) 6	--	7½	4
Mitchell	(6 mos.) 5	--	9½	1
Montgomery	(11 mos.) 2	--	13	--
Moore	(5 mos.) 4	--	10½	2
Nash	(10 mos.) 4½	--	32	--
New Hanover	(9 mos.) 15	--	20	1
Northampton	(10 mos.) no jail	-	39	10
Onslow	(8 mos.) 2½	--	5	--
Orange	(12 mos.) 4½	--	32½	5
Pender	(10 mos.) 3	--	4½	1
Person	(4 mos.) 4	--	25	--
Pitt	------ ---- --	--	---	--
Randolph	(8 mos.) 7	--	27	4
Richmond	(10 mos.) 8	--	9½	--
Robeson	(11 mos.) 16	--	9	--
Rockingham	--------------	--	----	--
Rowan	(12 mos.) 12	--	18½	7
Rutherford	(12 mos.) 13	--	29	3
Sampson	(10 mos.) 2	--	22	--
Stanly	(7 mos.) 2½	--	12½	--
Swain	(7 mos.) 1	--	----	3
Transylvania	(10 mos.) 1½	--	4	1
Tyrrell	(9 mos.) ----		2	2
Union	(12 mos.) 4½	--	19	5
Vance	(12 mos.) 4½	--	14	--
Wake	(12 mos.) 24	--	57	--
Warren	(11 mos.) 5	--	14	--
Washington	(9 mos.) 1	--	6	6
Watauga	--------------	--	---	2
Wayne	(11 mos.) 9	-	----	8
Wilson	(10 mos.(6	--	25	7
Yadkin	(5 mos.) 7		20	7
Yancey	(10 mos.) 2	--	----	--

The above table, giving the number of deaths occurring in the jails and poor-houses, was made up from special reports obtained from the superintendents of health. It is for one year, dating from March 1, 1889, to March 31, 1890. Reports were received from sixty-three counties, and show the following result:

In the jails in these counties there were during that year an average of 375 inmates. Of these there were only five deaths from disease, with four others by violence.

The poor-houses had a general population of 908, with deaths amounting to 222, or a little more than one-fourth of the whole number.

REPORT OF COMMITTEE TO INVESTIGATE THE WATER SUPPLY OF THE WESTERN INSANE ASYLUM.

DR. H. T. BAHNSON, *President of N. C. Board of Health.*

DEAR SIR:—Regarding the water supply of the Western Insane Asylum at Morganton, N. C.: From the superficial examination that we were able to make in the short time afforded by our recent visit, it seems that the most important change to be made in the pipe-line from the impounding reservoir to the institution, would be to increase the size of the pipe from the reservoir to the highest point in the profile or, the lowering of the pipe at that point. The pipe at that point evidently approaches too nearly the hydraulic mean gradient, and either or both of the changes suggested above would provide good results in increased supply that it would furnish the institution.

From other facts gathered it seems, further, that there may be other defects in the pipe-line that materially decreases the quality of water supplied, but they cannot be accurately determined without a more complete investigation than our visit afforded.

The storage capacity at the institution is not sufficient to completely utilize the water that is, or should be, delivered by the supply pipe, so that a great quantity goes to waste during the periods when but little is being used at the institution.

The storage capacity should be increased by at least 200,000 gallons. This would furnish a more constant supply, and further greatly eliminate the dangerous results that might arise from any accident to the supply pipe.

The air supplied to the sleeping rooms of the Superintendent's family is drawn through some of the basement rooms in which stores are kept. The air must therefore be more or less contaminated. A case of diphtheria among his children suggests the possibility of *dangerous* contaminations. In any event, it is clearly unsanitary to envelope young children, to say nothing of adults, in such an atmosphere. We are decidedly of the opinion that this state of affairs should be remedied.

RICHARD H. LEWIS, M. D.
J. L. LUDLOW, C. E

APPENDIX.

DISINFECTION.

READ BY PROF. F. P. VENABLE. PH. D., AT THE MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION, IN CHARLESTON, S. C.

One of the most important branches of sanitary science is disinfection. It is far from an exact science, still much of the earlier confusion and ignorance has been done away with and an army of earnest workers have made great progress toward placing it upon a thoroughly scientific basis. By disinfection, I mean the application of disinfectants to the destruction of the disease-causing germs, and not the quarantining, airing, cleansing, or similar sanitary measures sometimes included under the name.

However hopeful the progress that is being made, anyone glancing at the subject will still see much confusion and lack of scientific system. System cannot come into play until facts are assured, and there are few facts as yet so firmly established as to afford secure footing to those who seek to clear the road still further.

What are the disinfectants, and what shall be our tests for their value? Many substances are unquestionably still classed among them which deserve no place in the list—classed there, sometimes, because man has been attempting to disinfect his surroundings from earliest history, and it is difficult to dislodge a settled belief in a favorite remedy.

Nor are we fully agreed by what method of testing we shall set about to purge these lists of all not properly disinfectants, and it is by no manner of means so easy as at first glance it would seem. Almost universally it is believed that we must antagonize the living micro-organisms which modern science has revealed to be the causes of many diseases. It would seem to be a simple matter to find out what bodies were capable of destroying these organisms, but we dare not rest content with that. The vitality of the germs must be destroyed also. And we cannot place dependence upon laboratory experiments alone. The all-important practical question is, Are they destroyed in the surroundings and under the complicated conditions in which they occur where the disinfection is really to be carried out? For instance, in the laboratory a temperature of 125°–150° C. would completely devitalize most germs, but the difficulty of carrying such a method out in practice, and the liability to errors, was shown by Koch and Wolffhugel, who proved that after four hours' exposure to that temperature, the interior of a roll of cloth one metre in thickness was only 34.5° C.

Shall we trust, then, rather to the practical results obtained by the use of disinfectants? Who can tell why diphtheria or typhoid or scarlet fever strikes the one and spares the other? In a mass of statistics how can we consider the many details that have so important a bearing, such as how the disinfectant was used, what were the chances for, after infection, the virulence of the disease, and the climatic conditions?

I must confess that I strongly incline to the conclusion of Wernich, that labor is misdirected in testing the thousand-and-one things recommended as disinfectants by tests which cannot be regarded as above suspicion. Hope lies rather in more thorough study of the micro-organisms themselves, and in seeking to provide immunity from their attacks. Nature has given a valuable pointer along this line in the immunity afforded in some diseases by one attack, and the leaders of bacteriological research are making brilliant discoveries in this direction. Meanwhile, through this possibly misdirected, yet not wasted, labor upon the disinfectants our protection is mainly secured.

But much of the unsatisfactory condition of the practice of disinfection comes from ignorance as to the nature and inter-action of the bodies used as disinfectants—that is, from a lack of chemical knowledge and training—and it is this side of the subject that I wish to bring to your attention to-day. Because chloride of lime is a good substance to use and carbolic acid is also, it by no manner of means follows that you get the good effects of both by mixing them, as I have seen lately proposed.

Recently a health officer was reported as proposing to prepare chlorine by the use of oxide of magnesia and sulphuric acid. Perhaps he did not mean it, or was incorrectly reported, but certainly there is grievous lack of knowledge on the part of many of our local boards of health of the chemistry of the substances they handle. Hence, their misapplication and consequent failure, begetting in the minds of the people a want of confidence, or even unconcealed distrust and disapproval.

The desideratum in the use of a disinfectant is to secure complete destruction of the micro-organisms and their spores with as little injury as possible to valuable property. Many of the chemical substances used are very powerful, even in considerable dilution attacking with energy clothing, furniture, varnishes, paints, &c. Some attack one material and some another. It is possible, by a wise choice of disinfectants, according to the object to be disinfected, to avoid injury in nearly every case. Lists of such disinfectants for special purposes have been published in some of our sanitary journals—some of them excellent; some open to objections. It would be well if our State boards would prepare such lists for the use of local boards and physicians in general. They would thus furnish safe guides where most needed, and save much bungling work.

Let us take up some of the chief disinfectants and examine them chemically.

Mercuric chloride, or corrosive sublimate, is one of the foremost and most frequently used. However valuable mercury or chlorine may be separately, it is, so far as we know, just this compound that has the powerful disinfecting action. Therefore, if you change it to any other compound of mercury, you either destroy or greatly diminish its toxic action on the germs. Yet what is more common than to apply it to excreta containing sulphur compounds or albuminous bodies, thus working an entire change in the chloride and precipitating the mercury as sulphide. It is possible also that the ammonia present in urine and other bodies interferes with the action of the corrosive sublimate. It cannot be used in conjunction with chloride of lime as this would also give us a precipitate.

It should not be used on metalic surfaces, such as copper, brass or silver. The latter is especially injured by being washed over with such a solution Lastly, the very poisonous nature of the body should always be borne in mind, and the use of it avoided where it can in any way become noxious, as upon floors or walls, where it may dry and powder, and so get into the air. I know that it is frequently used in this latter way, and the danger may seem slight, yet I cannot but think the risk a useless one to run, especially in view of the known ease with which arsenic is thus diseminated.

Next let us look at the chemical side of chloride of lime. About this, it is first most important to recognize that it is no true chemical compound: that over forty per cent. of it is lime, and that fifteen to twenty per cent. is water; that the proportion of chlorine, the active principle, present varies in the commercial article from twenty to thirty-five per cent. and decreases on keeping, sometimes very rapidly; that this sudden decomposition makes it dangerous to keep it in tightly closed vessels, and that loosely closed ones hasten its decomposition by admitting the carbon dioxide of the air. Therefore, in making up disinfecting solutions it is important to know how fresh the chloride of lime is. It is easily possible in using old "bleach," as it is called, to get a solution so weak as to be useless. And it should be understood that chloride of calcium is by no manner of means the same thing, and is quite useless as a disinfectant. Because of its weakening nature on the fibre chloride of lime cannot be used on wool or silk, nor any delicate fabric, and its bleaching action prohibits its use on all colored stuffs, except certain mineral colors. In using it in the solid form its strongly alkaline nature must be borne in mind, and its power of combining with acids and neutralizing them. Where free chlorine is derived from it, of course enough of an acid must be added to it to make it distinctly acid Sulphuric acid would be the cheapest and best to use, next to that hydrochloric (muriatic) acid. The same amount of chlorine is gotten in either case. I may remark in this connection, that I greatly doubt whether chlorine reaches its full efficiency in a comparatively dry atmosphere. Like sulphur dioxide it should be aided by plenty of moisture. Contradictory experiments regarding its use are most probably to be accounted for on this ground.

When carbolic acid was first introduced it was believed to have all the qualifications necessary for a perfect disinfectant At the time of Lister the modes of thorough examination and testing for disinfecting agents were unknown. The discoveries of Koch and others in the line of bacteriological research have enabled us to eliminate many a formerly trusted agent, and greatly weakened the confidence once reposed in carbolic acid. Still, it is one of the most frequently used agents, and deserves to be placed among the few we have time to mention here. It seems clear that only in strong solutions, and by prolonged action, is it able to devitalize the bacteria and their spores. Chemically, it acts as an acid, though not truly such. It is, therefore, not to be used in conjunction with basic substances, as is so often done. Its compound with lime has been supposed to be useful as a disinfectant, but there is little ground to sanction its use. Its volatile nature, and consequent easy loss in solutions, must be kept in mind. Solutions of it in alcohol and oils are, according to Koch, entirely without action. As it has been shown to be useful in surgery only in such concentrated solutions and for such a length of time as would have injurious action upon the subject, I do not see how it can have beneficial action in disinfecting the air of a sick-room, unless used in quantities too great for the inmate to bear. The same is, of course, true of the burning of sulphur in the presence of the patient. From earliest times sulphur has been burned for disinfecting purposes. Homer makes his hero Ulysses use it, and if our grandmothers believed in anything, they believed in sulphur. Many a dog has been forced to lap his water from a pan with the insoluble and useless sulphur lying at the bottom, and in some mysterious way preventing all mischief. Many a child has, in times of panic over some epidemic, worn about his neck a little charm-bag of sulphur. Now, so universal a use must rest upon some basis of truth. Dismissing the mysterious action in bag and water, which might be by courtesy called katalytic (the chemist's favorite name for reactions he does not understand), we find the consensus of opinion to be that the vapors of burning sulphur are disinfectant in their action when properly used I do not intend here to enter upon the discussion which has been so exhaustively carried on for some time past as to the value of sulphur dioxide. Indeed, the necessity for brevity has throughout this paper prevented the citation of authorities and their opinions. Suffice it to say that when Sternberg finds that he can pour liquid sulphur dioxide upon the baccilli of anthrax without impairing their germinating power, we may conclude that sulphur dioxide, without water, is absolutely worthless. In other words, not sulphur dioxide, but sulphurous acid is the active agent. In common practice the amount of water present during the fumigation is altogether inadequate. Allowing for waste and other losses, at least three or four times the weight of the sulphur burned should be present in the air of the space to be disinfected. This can be easily effected by keeping up a rapid evaporation by boiling water in a vessel exposing a large surface of water, and, besides, the walls and articles in the room should be sprinkled or wetted beforehand.

Here the water has a chemical part to play—without it sulphurous acid is not formed, and it is this that has the devitalizing action. Those who busy themselves with the study of such matters are becoming more and more impressed with the importance of the presence of water in disinfecting action. Chemists have for some years had their eyes open to its important role in many chemical reactions where its presence or aid was not before suspected. So powerful a chemical agent as chlorine is without action, if dry, on many substances which it eagerly attacks when the slightest trace of moisture is present. Metallic sodium remains bright and unoxidized in dry oxygen. Ordinary illuminating gas will not burn if it and the needed oxygen are dry, and some years ago it was proved in my laboratory, and afterwards abundantly confirmed by others, that even the hydrogen and oxygen that go to form water cannot unite unless themselves a little moist. Much of this we cannot now explain. It may be due to chemical causes or to physical. Enough that its truth be recognized.

It is well known that the causes of infection, the microbes, need moisture for their existence. When thoroughly dried they are inactive and eventually die. But too much water is also very prejudicial to them, and some even maintain that a great dilution of water containing them is a practical disinfection. Now, a dry disinfectant coming in contact with an air-dry micro-organism can have little or no action upon it, water, the condition for chemical reaction, being absent.

The chemical action in the case of sulphurous acid may be the taking of oxygen from the organic matter of the germ, or the combining with the complex molecule, and so destroying it: the absorption of additional oxygen and formation of sulphuric acid being the most noteworthy chemical tendency on the part of sulphurous acid. Chlorine probably acts upon the microbes as it does in bleaching, by combining with the hydrogen of water and setting free the oxygen, which, at the moment of liberation, acts very powerfully on oxidizable matter

Both chlorine and sulphurous acid having decided bleaching action, their use should be avoided, if possible, where there are valuable colored objects which might be injured by them.

As to the best disinfecting agents, heated air and steam, the difficulties are mainly physical, and the mechanic, not the chemist, has to be called in. Air, even moist air, at a high temperature acts slowly, and sometimes imperfectly. Steam is to be preferred to it, but even steam at 100° has been known to act for five hours without destroying the vitality of some very refractory baccilli. Most varnished and painted objects suffer under the action of the steam; furs shrink, and leather is rendered brittle and useless by it.

I have been able only to take up three or four of the chief disinfectants, and discuss briefly some of their chemical characteristics. I fear that I have brought little or nothing that is new before this body. But, perhaps, some facts have been brought freshly to your minds, and through you they may reach a larger, less learned audience, and so put an end to some of the misuse and abuse of disinfectants.

THE CARE OF THE INSANE OF OUR STATE OUTSIDE OF THE ASYLUMS.

By James A. Hodges, M. D., Fayetteville, Member of the North Carolina Board of Health.

For the care and cure of the insane in our State there exists three asylums—two for the white and one for the colored population.

These institutions, in the past, have accomplished a grand and beneficent work for humanity. As far as their limited capacities would allow, they have done much to relieve the sum of human misery, especially that most dreadful form in which reason is dethroned and the passions have supreme sway, and in which that most sensitive and complex organ of the body, the brain, is the one diseased.

The value of asylum treatment cannot be estimated. Insanity is the most distressing disease that is known to man, and the most far-reaching in its dangerous and damaging effects upon society at large. When a cure is effected the results are perceptible and easily recognizable by all, but the benefits, both direct and indirect, accruing to those whose minds are more darkly shrouded and upon whom the sunlight of reason may never break to dispel the dark midnight of gloom, are incalculable and all but incomprehensible. In the environments of a well-ordered institution the laws of hygiene are intelligently and rigorously enforced; good air, good water, good food, sunlight and cleanliness are all secured and maintained.

The treatment pursued is under the supervision of skilled alienists, assisted by experienced attendants. As a result, the physical powers are kept at their highest standard, and consequently the nutritive disorders of the brain are likely to be vastly and permanently improved. By well-directed regulations and in well-appointed apartments, the poor sufferer, sick in mind and body, is soothed and quieted, his pain assuaged and his specters banished. Likewise, the bereaved and sympathizing friends at home are relieved of care and trouble and anxiety, for they are conscious that, under the protection of the asylum, the tottering and enfeebled intellect of their quondam patient is being skilfully and intelligently treated; that his weak and diseased body is being cared for; that the possibility of accident or crime will be prevented, and that, if possible, renewed life and vigor and perception will be instilled into that once dull and leaden brain, and the glad light of reason and intelligence once more flood that suffering soul.

Since the establishment of the North Carolina Insane Asylum, the oldest of our institutions, there have been, according to their last report, 540 recoveries recorded among its patients. These, if left to themselves in their state of mental aberration, according to the usual reckoning, would have dragged out an average of seventeen years of useless existence, entailing upon the State, the county, or personal friends, the aggregate of 10,000 years of misery and insanity, to be paid for out of somebody's wealth. On the other hand, being cured, 16,000 years of usefulness, allowing an average of twenty-nine years, according to statistics, after recovery, to each patient, has been gained and will be preserved for the benefits and uses of society. In addition to this number of 540 who have been restored to society and thus made producers and tax-payers instead of encumbrances, as formerly, fully one-half as many more have been returned to their homes improved in bodily and mental health.

These are some of the advantages and benefits resulting from asylum care and treatment. But, under the present regime in our State, the largest number of our insane population are not cared for in properly constituted asylums, but are detained in the county jails and poor-houses, and it is our duty to inquire into the conditions there surrounding them, and the methods there practiced in their care and treatment.

The jails, as all are well aware, are ill-adapted for the purposes of an asylum, and, to the credit of humanity and the spirit of the age, be it said, that only urgent cases are confined in them, and for the shortest possible time consistent with the circumstances. The poor-houses are more extensively used for asylum purposes, and, taken collectively all over the State, they present a vivid picture of misery and horror. As a class, they are a disgrace to civilization and humanity, and could more properly be designated as *pest-houses.* In most cases the buildings are dilapidated, cheerless and poorly lighted, constructed without plan and patched by additions and repairs. It is to be regretted that such squalid institutions should ever be allowed the custody of the insane even for one moment.

In the common diseases to which "flesh is heir," there are known, in our present state of knowledge, three classes, according to the results of therapeusis: First, those forms of disease whose tendency is to recover without treatment, or in spite of bad treatment; second, those which are incapable of cure by any known methods of treatment; and third, a small number of cases which depend solely on the treatment. If this be true of diseases as seen in every-day practice, how much truer must it be of diseases of the mind, where the body's most highly delicate and sensitive organ is implicated, and what hope of benefiting, much less curing, these mental diseases is there to be held out to these suffering ones, especially under such circumstances and in such surroundings as are offered in county poor-houses? What are the facts, then, as regards the care and treament of the insane in these institutions?

1. There is no system of classification as to the kind or degree of mental derangement. The patients are thrust away by themselves into wretched out-buildings, and are herded together as so many beasts of the field—the curable and the incurable, the harmless and the violent—the one, by the association with the other, delaying each other's recu-

peration and recovery. The filthy are, too, often thrown with the decent, the aged and enfeebled with the young and strong; and if, as a result, a patient is found with a broken limb or a blackened eye, no cause for it is assigned and no record is kept.

2. No alienists are connected with these institutions. The patients, while needing constant medical care and attention, are only visited once a week, or month, perhaps, by underpaid physicians, whose salaries, according to the State Board of Health, average less than $300 per annum; and, besides these duties, they are expected to attend, free of charge, all indigent suppliants who may desire their services.

3. The attendance is insufficient and inexperienced. The number of attendants will average one to every twenty patients in the poor-houses; but this does not represent the actual state of affairs, even, for generally the only attendants are the more active and able-bodied paupers, who often perform their enforced duties in an unintelligent manner and always grudgingly, because they feel and recognize that the duties are an imposition. The quality of this service should be of a superior order, for most cases require constant care and attention, and this does not apply to the dangerous and destructive cases only, but to the broken-down and enfeebled as well. As a consequence of this arrangement, but little attention is given to the patients during the day, and no supervision at all is exercised at night, for, retiring to their own apartments, which are far removed from this "madding crowd," the attendants wrap the drapery of their couch about them and lie down to pleasant dreams, oblivious of the shrieks and frenzies of these unfortunates, to whose fevered brains "nature's sweet restorer" never comes to soothe and quiet by her gentle wooings. This lack of humanity requires no comment; *it is disgraceful beyond palliation!*

4. There are no hospital arrangements. Every well-appointed institution for the care of the insane should have

proper accommodations for the acutely sick, as well as facilities for bathing, together with means of occupation and amusement. In the county poor-houses no especial care is given to the sick. It is sufficient excuse for the heartless attendants to know that their patients are under the ban of mental disease, and that their minds are too feeble to take cognizance of the sorrowings or note the lack of attention. They console themselves with the comforting thought that, being insane, the patient can never recover, and they thus preserve a "masterly inactivity," stopping their ears and closing their eyes to the agonies of sorrow and suffering all about them. In the matter of bathing, it is a recognized necessity that there should be an abundant supply of pure water in every asylum where the insane are confined; yet, as a matter of fact, this is a point in the treatment of lunatics in county asylums which is essentially defective. As insane people frequently suffer from ulcerations of the body and other skin affections, cleanliness is imperatively necessary, but, instead, the repulsiveness of the filth too often seen is horrible to look upon. What Superintendent of Health in this audience can say truthfully to-day that he has one single raving lunatic in his county asylum under his charge that is as neat and cleanly as he should be, if comfort and health are to be promoted thereby?

5. There are no proper sleeping accommodations. Insane people require more sleep than persons of healthy minds; but, in our county institutions, this desideratum is incapable of being realized, first, on account, oftentimes, of the noisy surroundings, and secondly, because of the uncomfortable arrangements for sleeping. The hard bare floor too often suffices, alas! for pillowing the aching head and resting the cramped and tortured limbs; and if there be any beds, these are generally the homes of countless hordes of vermin, and too vile for description.

6. There are no adequate heating facilities. But few counties have devised adequate means for distributing heat in the

wards of the insane patients that are confined, and, as a result, some, if not all of them, being ill-nourished, poorly clothed, and helpless, by reason of physical infirmities and mental weakness, to aid themselves, must suffer in the miserable apartments provided the pangs of an unutterable existence, exposed as they are to the cold blasts of winter's storms and tempests.

7. There is no regular dietary prescribed. The food which these poor wretches are expected to eat is oftentimes abominable, and it is a known fact that a wholesome and nutritious diet is of the greatest importance in the treatment of the insane. Besides, the food furnished is often regulated for those who are well and sick alike by some attendant of the poor-house, or perhaps even by the cook of the institution! It is thrust through an opening into the cell, it may be, and left there to be consumed or not, at the will of the babbling maniac or helpless imbecile! Salt pork is allowed once or twice a day, salt mackerel once or twice a month, perhaps, throughout the year, with a little rice or beef occasionally as a toothsome *entree!* Despite the fact that farms are attached to most of the poor-houses, vegetables are not grown in sufficient quantity or variety to offset this hard diet. The sole object of the Superintendent seems to be to screw down expenses, and thus curry favor with the County Commissioners, even if his poor and feeble charges do suffer and starve!

8. There is no suitable provision for refractory patients. The dominant idea seems to prevail in these institutions that all being alike bereft of reason, all should receive the same routine treatment. However, it sometimes occurs that the more violent have to be more forcibly restrained, and these are either confined in a jail or darkened cell. Restraint is applied at the will of an untrained attendant when in his judgment it is deemed necessary. This sounds like a tale of feudal time, but it is true, nevertheless.

"Does the patient disturb others?" then the mandate goes forth, "narcotize him, or muzzle, or manacle him." If that be impossible, he is very probably removed to the jail building, where others like himself are confined in the various stages of insanity, and where the genius of Pandemonium reigns supreme. There his sick and fevered brain, haunted before only by his own phantasmagoria, "beholds now materialized the most hideous spectres of his imagination." And it is doubtful, indeed, if anyone in wildest delirium has has ever seen aught to compare with the waking nightmares experienced in some of these poor-house jails.

Such, gentlemen, are some of the evils in county asylums as illustrated in some of our poor-houses. This picture is not overdrawn, but its every feature and outline is perfect, and is fashioned without an artist's skill from the scenes of real life as portrayed in our county institutions. Here all laws of hygiene are disregarded, and no attempt at proper treatment even undertaken—all are treated alike, and the wild maniac, the unkempt epileptic, as well as the chronic incurable, are all subjected to the same conditions and surroundings, each constantly a hindrance to the other in improvement and restoration to health. Above all, the greatest sin and crime that can be attached to these institutions, as they now exist, is that acute curable cases, those which, under proper and skilled treatment, would recover in from three weeks to three months, are here detained until, by association, they are placed beyond the pale of curability. Who among you has ever known a case of insanity, of any kind or degree, to recover after being entrusted to one of these institutions? I ask you, who?

To the shame of the State, also, be it known that many insane have been detained in the walls of these asylums for long years, either from ignorance or neglect on the part of the attendants or Superintendents, one case in my knowledge languishing in the county institutions for thirteen years before being sent to the asylum for treatment.

From the above it is evident, then, that in the asylums already existing, and in the county institutions as at present administered, there are grievous evils. What are these evils? (1) Overcrowding in the State asylums, and (2) as a result, the detention of insane patients in jails and poor houses. How can the first evil, and, as a natural consequence, the second, be explained? Simply and solely because of the State's brutal parsimony in the past in not providing needful buildings for the reception and treatment of its increasing insane population.

Is there now any necessity for this step? Let the records speak for themselves. The three existing asylums in this State are capable of treating comfortably and skilfully about nine hundred patients. To the Western Asylum are assigned forty counties, and to the North Carolina Asylum at Raleigh fifty-six counties. In this latter division, known as the Eastern Division of the State, there are said to be, according to the last report of the President of the Board of Directors of the Raleigh Asylum, about one thousand white insane, while the asylum is only capable of treating, at most, two hundred and fifty patients. There are, consequently, in this division alone, four times as many white insane, not to mention the colored, unprovided for as are now cared for by the State in this asylum, or, in this division alone, equally as many as are now in all the asylums. It is a fact, too, that in all of the asylums nearly three-fourths of the patients are chronic cases, who thus occupy the wards to the exclusion of others who might fill their places and again become producers and tax-payers. From some of these institutions, as a consequence, comes to us the reply with every new application, be it urgent or not, that they are overcrowded and that our patient must wait—yes, wait, and die, perhaps—or, what is worse, sink into incurable insanity, with its attendant train of living miseries! These are startling facts, and must fill every right-thinking citizen's mind with shame, as well as anxious thought and inquiry. It shows, beyond all dispute, that the State is not doing her duty towards her helpless insane, and that the largest number of this unfortunate class are now unprovided for, except in the most frugal and parsimonious manner, as proved by the system of county asylums, of which we have spoken.

The recent action of the Executive Committee of the North Carolina Insane Asylum in ordering the county officers, according to law, to remove their harmless and incurable insane from that asylum, will be a telling object-lesson to the citizens of this State. It is true that we recognize the justice of such an action by the officials, but it is nevertheless a crying disgrace to our State and its advancing civilization that there was need for such action, and that the legislators in the past, in their short-sighted wisdom, ever attempted to remedy *such* evils as the existing ones in *such* a manner. The ignorance and inhumanity of the State in this matter will be seen and felt as never before, and a loud cry of indignation will go up all over this land against the State government, which has failed in the past to give relief, and which to-day can consequently present no solution of this important subject, for it has no policy outlined except the despicable one just mentioned, and can offer no provision to meet the growing requirements of this class of its unfortunates who have equal rights with all other citizens of their State. What shall be the remedy?

The only remedy now remaining for this evil of "overcrowding" in the asylums, and consequently the necessary detention of the insane in the county poor-houses is to educate the masses to the existing state of affairs, and to demand of the coming Legislature the State's aid in erecting more commodious apartments, so that all sufferers from mental diseases may have like advantages of skilled treatment and supervision.

As I have already endeavored, in a general way, to show you, the present system of detaining the insane in jails and poor-houses, which for better means is at present our only reason, is attended with many and grievous evils. That you may know more concisely and accurately the present status of affairs, and may more readily perceive the necessity of enlarged capacity in asylum treatment and more pertinently judge that the whole system of county charity, like that of the State, is based upon a niggardly and parsimonious economy, I would invite your attention to the following statistics as collected and compiled by my friend, Captain John B. Broadfoot, of Fayetteville, a director in the North Carolina Insane Asylum, and a young man who having recognized the necessity of this unfortunate class of our population, and being zealous of having some wise and humane provision made for them, is the first to get absolutely accurate information on this subject. The result of his labors, as thus far completed, I will now present:

Forty-three counties were heard from, and the total number of insane in them, outside of the asylums, as reported, was 373, or an average of 8½ to the county. This is certainly a low estimate, for nearly every correspondent wrote that they had no means of determining the exact number, but would report only those cases which had come under their personal notice, which was always, of course, but a part of the whole. According to the same ratio the 96 counties would contain 816 insane outside of the State asylums. The largest number were in Johnston, 26; the next largest number were in Union, 24; several have from 15 to 20. Ashe, Burke, Clay, Davidson and Pamlico have none. The western counties report the smallest number The insane in these counties are distributed as follows: In poor houses, 140; in jails, 17; outside of county institutions, 216. According to sex: Males, 181; females. 192. According to race: Whites, 258; colored, 115. Macon and Clay have no poor-houses.

He also submitted the three following questions:

1. Average duration of confinement of insane in county institutions? The replies to this question were so unsatisfactory that no satisfactory average could be arrived at, no

records having been kept in many instances. From statistics received, however, we infer that eight years is the average duration of confinement.

2. Have you the proper means of confining and treating the insane? To this question every county heard from answers, emphatically, "No!" except Watauga, whose Superintendent of Health answers "Yes," and that the *per capita* cost of maintaining the insane in his county is $48 per annum—that is, $4 per month, $1 per week, or 14 cents per day. Think of it! Does it not seem incredible that a human being could be lodged, clothed, cared for and fed for a twelve-month on so small an amount? Your horse, indeed, could not be stabled for twice that sum.

The replies to some of these circulars are revelations, indeed, and the tale of agony told is all but heartrending. Listen, for instance, to the following: "We have tried to get some of those at large into the asylum, but have failed. Those who are at large are treated mostly by myself, without compensation. Is it right?" Or listen to this: "We haven't any insane in jail or asylums, from the fact that Commissioners will not allow a physician any fee for examining insane patients, and they cannot be admitted without examination. I have been informed that, in one instance, an insane patient was charged with larceny in order to have him admitted and confined in jail. Our insane are sadly neglected. I have reported only one case, but I have no doubt there are several cases, but, *as they do not receive any attention*, they are not reported." Or another: "There are at present no lunatics in the jail; until this year, from one to three. They are confined in a small log house, with no windows and no heat; have seen one poor fellow nude in the coldest weather, without any means of heating his room. I remember one case where they had no room in the poor-house, and the Superintendent chained the patient to a staple in the centre of a room by the leg, and, as a consequence, she suffered with sores to her death."

3. What is the average cost of maintenance in county institutions? From the statistics received the average cost of maintenance in county institutions per year was found to be $85.78. These figures are suggestive, and while they give the lowest possible estimates in every case, still the information is startling, indeed. They prove, in the first place, that the insane already provided for by the State, numbering 900, are less in number than those unprovided for, amounting to over 1,000; and in the second place, that the average cost of maintenance in the county institutions, which is $85 78, is owing to cruel parsimony; but small as this amount appears at first view, it is yet a large expenditure *per capita* in comparison with the general average of the three asylums in this State, which is $168.08, when it is considered what are the comparative benefits gained in the two systems, the former, *i. e.*, the county cost, being almost solely for food, while the latter, *i. e.*, the asylum cost, includes not only food, but skilled treatment and attention with all their blessings. The mere cost of food in the State asylums is as little, if not less, than the estimated cost in county institutions.

If the *per capita* cost of $85.78 in the county system be compared with the *per capita* cost of the Goldsboro Asylum, for instance, which, although for the negro population, still has all the asylum advantages, and which is but $116.75, it will be seen that there is an excess of but about $30 per annum; or, to put it differently, the cost *per capita* in the Goldsboro Asylum is $9.75 per month, which includes all the benefits and privileges of asylum treatment, against $7.50 *per capita* per month in the county institutions with no treatment nor privileges nor comforts at all.

The comparative average cost of similar institutions in New York State is $18 *per capita* per month in the asylums, against $6.80 *per capita* per month in the county institutions. Without further amplification, I leave you to the consideration of these facts and figures, that you may determine in your own minds which of the two systems, both costing about the same, all things being included, is to be preferred.

As a matter in near relation to this subject, I would also bring to your attention the fact that two other classes of our population are not properly provided for by law, namely, inebriates and idiots. The former can only be treated in our asylums when they are adjudged lunatics, and the latter, who will always be a burden to the State or to friends, have no suitable and separate provision made for them. Under proper treatment, many inebriates could be rescued from insanity and made once more (and oftentimes in a short period) self-supporting individuals. It is an urgent necessity that something should be done at once, also, looking to these classes of our citizens.

Now, as a solution of this problem, in all its phases, I offer the following recommendations for the consideration of the Society: To appoint a conference committee, consisting of twelve members, viz., the Superintendent of each of our three asylums, two directors from each asylum, and three physicians from the State Board of Health, whose duty it shall be to go before the Committee on Asylums at the next approaching General Assembly and urge the passage of a bill which shall have for its object the relief of the insane of the State outside of the asylums.

If the State cannot be induced to make suitable provision for all of her insane, as she should do, the counties, each for its own, must, and I believe will; but we will wait and hope for better things. We cannot believe that this proud State, mother of us all, will allow any of her children to suffer and to sink into degradation and crime and misery, when, with her beneficent hand, she can elevate and ennoble and enlighten them. When the existing and appalling facts are brought forcibly and persuasively to her attention by the intelligent masses of our people, she will not, for long, continue to smirch her fair escutcheon with so foul a blot, nor stand forth in the galaxy of nations as the land "that careth not for her own," but, rising above the seas of ignorance and prejudice, she will shine forth in the plenitude of her munificence and send out the glad rays of beneficence and intelligence into every home in our fair land.

In furthering and accomplishing this grand work for humanity, it devolves upon us especially, as physicians and scientific men, to educate the public mind to the pressing needs of this unfortunate class of which I have spoken, and the State's responsibility to care for such in a manner becoming the advanced civilization of the day. By training, by knowledge and by experience, we are aware of the facts and necessities of the case, and, with our individual and combined influence, we could arouse the legislators of the approaching General Assembly of North Carolina to honest, earnest and conscientious action in behalf of the insane of our State.

It should be no idle dream of an enthusiast which should actuate us; neither should it be a selfish motive nor a maudlin sentiment that inspires us, but, instead, a true love of our State and a righteous regard for her citizens and their vested rights, our battle-cry being, "Help for the Curables; Hope for the Incurables."

THE SANITARY ANALYSIS OF WATER.

By F. P. Venable, Ph.D., F. C. S., Professor Chemistry University of North Carolina and Member of the North Carolina Board of Health.

I fear that this paper will seem rather a confession of ignorance and of inability to cope with the difficulties of the problem on the part of the chemical profession, than one bringing to you instruction and aid. But I shall at least point out to you what are those difficulties and how great they are, and so make some excuse for our failure to meet them. Of course we have made some progress toward the solution of these questions, but the solutions are, as you will see, imperfect.

I wish to speak of the subject with special reference to the water-supply of this State as being of most immediate interest to us.

We learn from the very instructive paper of Dr. Bahnson, the present President of our State Board of Health, delivered at the first Convention of the North Carolina Sanitary Association, that only ten of our cities and towns have systems of water-works in popular use. This leaves a great majority of our population dependent either upon springs or wells. Even in some of the towns boasting of water-works the supply is drawn from shallow wells.

At the risk of wearying you, I will repeat, in part, that which was said in the address just quoted about the possibility of pollution of such water-supplies. It is only by repetition that the lesson can be thoroughly learned, and you must learn it if, as physicians and sanitarians, you would do your duty in this matter.

We must not look for such a thing as absolutely pure water, because this is unknown outside of the chemist's laboratory, and would neither be palatable nor wholesome if we could procure it for general use. All natural waters contain foreign matter, and there is, therefore, such a thing as a normal impurity. We class under this heading the oxygen, nitrogen and carbonic acid washed out of the air, and, in small amounts, certain of the commonest mineral matters dissolved from the earth. These we expect to find in all natural waters, as the rain and the surface-water have gotten their materials from the air and soil. If either air or soil contain matter injurious to health, it is easily possible that the water can become noxious in its passage through them.

Leaving out of consideration the hurtful substances sometimes occurring in the air, it is evident that where the soil is impregnated with filth or decaying matter, the water flowing over it and seeping through it will become polluted. I well remember a summer spent in a small town whose water-supply came from springs at the foot of a hill upon whose sloping sides the cemetery was placed. So bad was the water that, in fifteen minutes after being drawn from the hydrant, it became too offensive to be left in the room. Was it surprising that, out of five of us, three had typhoid fever, and the two not affected attributed their escape to precipitate flight?

Whether a spring or well-water, then, is pure, in the ordinary sense of the word, depends, first, upon the freedom of the surrounding soil from sources of corruption; and, secondly, the chances the soil and the water have of freeing themselves from pollution. It is safe to take, as a rule, that no soil in a thickly settled neighborhood is free from filth and decaying matter. With no system of drainage nor burning of garbage, with privies, pig-styes and stables huddled in among human dwellings, the ground becomes coated with a covering of organic refuse, and as this collects, from year to year, the soil may become saturated to a great depth. How close stables, privies, etc., may be to a well without contaminating its water depends upon the nature of the soil—whether sand, clay or rock—and upon the conformation or dip of the strata.

The soil has a certain power of freeing itself from these contaminating materials, being aided in this by the oxygen of the air, the roots of plants and certain organisms existing in the soil. The water is partially freed from these materials by filtering through the soil, and the absorbed oxygen in it can also oxidize these matters, partly, but the absorbed oxygen is soon used up, and even a great depth of soil can become impregnated with filth, and, so far from acting as a filter to remove impurity, gives up pollution to fresh water.

Of course a shallow well, with no great depth of soil for filtration, is easiest polluted, but the pollution of one much deeper is only a matter of time.

It needs no discussion in these days to convince one that impure water is unhealthy, and that water polluted in certain ways can be a conveyer of most dangerous diseases. A noteworthy proof of this was told me a few months ago by a former member of this Society. In a small city, where a pure water-supply had been introduced some three years before, there had since occurred sixty-five cases of typhoid fever. Only three of these were in families using the pure water-supply. The remainder made use of the old wells of the town, which should have been closed by law.

It is needless to multiply cases to prove that water can convey disease. The question rather is, What sort of impurity and how much must the water contain in order to cause disease? The chemist must decide these points when called upon to make a water analysis for sanitary purposes, and his task is a difficult one.

First, as to the kind of impurity which should be classed as dangerous to health. We would bring under this heading all dejecta of animals and decaying organic matter. Even if not absolutely dangerous in themselves, they form excellent media for the propagation of dangerous organisms, and it is the sanitarian's duty to avoid such conditions.

Dr. Mallet says, in his report to the National Board of Health: "If the theory be accepted which has so much in its favor, attributing the production of disease by organic matter in drinking-water not to any specifically poisonous substance or substances, but to the presence and action of living organisms, it seems quite conceivable that a water containing organic matter of any kind, including vegetable matter, may be harmless at one time and harmful at another, when perhaps a different stage of fermentation or putrefactive change may have been entered upon, and special organisms may have made their appearance or entered upon a new phase of existence. Thus, there might possibly be safety in drinking a peaty water, or water filtered through beds of dead forest leaves, when fresh; danger when, after a certain amount of atmospheric exposure, bacterial organisms had become developed; and safety again, perhaps, after the growth of such organisms had fallen off and more or less of the available organic matter had been consumed."

That Dr. Emmerich drank dilute sewage for a number of days in succession, and persuaded several of his patients also to do the same, without ill effect, is, therefore, by no means a proof that such water is not dangerous.

Our attention must be turned, then, to this other kind of organic impurity, the organized, animate matter, low forms of life, organisms capable of causing specific disease. These consist also, of course, of organic matter, and are nourished by it. Organisms of some kind are present in all waters, and we must distinguish here also between the non-dangerous disease producers or pathogenic

It is towards this kind of impurity that attention is most directed of late. I think the aim of the chemical analysis is coming to be the answer of the question, "Is this water one containing the materials favorable for a flourishing growth of such organisms?" And if the answer is affirmative, the water should be rejected, because recent research has pointed out that these enemies to health are lurking for us in both air and soil. A recent note, collating what is known on the subject, appeared in the *Sanitary News* for May 3, 1890. It is stated that the superficial strata of the earth are extremely rich in pathogenic germs. A foot or two below the surface they cease to exist. Soil rich in organic matter is not favorable for their development. Causes of death of these pathogenic germs are, first, exsiccation, the light of the sun and saprophytic baccilli. The walls of a well are a prolongation of the superfices, and are favorable to the life of the germs. Water, then, in a favorable condition for the propagation of these germs, soaking through colonies of them, carries them on down into the well, where exsiccation is impossible, the solar light never comes and the saprophytic baccilli are overworked.

I should include among the injurious impurities mineral matter in abnormal amount, but this is easily detected by chemical analysis and need not be referred to again.

In an analysis of water for sanitary purposes, then, sewage and similar fermenting or decaying organic matter are the things to be looked for. As to the amount of such impurity which may be present without prejudicing health, it is best to be on the safe side and reject all waters where even the slightest contamination is proven. It is right here that one of the main difficulties lies. The amounts to be determined are so exceedingly small that even our most refined methods of analysis sometimes fail us. In reporting such an analysis we give the amounts in 100,000 parts, but, to be accurate, they must be determined as parts in 1,000,000, and are frequently so reported.

While this exceedingly small amount of organic matter, often to be found in dangerous waters, makes the analysis more difficult, it may be pointed out that it also militates against the theory that it is the organic matter itself which is noxious.

Dr. Mallet reports, in regard to some of the samples of water analyzed under his direction in the course of his research for the National Board of Health: "If the whole of the organic carbon and nitrogen found in such waters as Nos. 35 and 36, of the highly dangerous character of which there can scarcely be a doubt, existed as strychnine, it would be necessary to drink about half a gallon of the water at once in order to swallow an average medicinal dose of the alkaloid. It is not easy to believe that ptomaines, or any other chemical products of the putrefactive change, as yet observed, can possess an intensity of toxic power so very much greater than that of the most energetic of recognized poisons. A second difficulty lies in the ease and rapidity of change in the original organic matter. It is scarcely ever practicable to examine the water for the dejecta or other organic matter, direct. We must know something of the products of the putrefactive changes and search for them. This means, of course, looking for the greatly smaller parts where the whole was so small as almost to elude us, and furthermore, it means a great deal of inferential work, often of the most misleading nature. The products may have come from some comparatively harmless vegetable source, instead of dejecta."

The determination of the total organic matter present, by oxidation or combustion, which is done in all ordinary analyses, gives no reliable indication as to the sanitary condition of the water, and needs the confirmation of other tests. As the nitrogenous matter is the most dangerous, and more commonly animal than vegetable, the analysis is generally directed to the determination of the ammonia, or nitric acid, or nitrous acid resulting from its decomposition. In one of the methods, the decomposing organic matter is made to yield its nitrogen, as ammonia, by boiling with an alkaline solution of potassium permanganate. Wancklyn rejects all water as dangerously impure that contains over eight parts of such ammonia in 1,000,000 parts of water.

As nitrous acid can occur in the purest of water, it is difficult to fix a limit beyond which we can say that the water containing it has been contaminated. It is usual to say that, in anything greater than traces, it points to decomposing organic matter. In analyses it is reported as combined; hence, under the heading of nitrates.

Nitric acid, present as nitrates, may occur in uncontaminated water up to 1.5 parts in the million, and hence it is only when it exceeds this amount that it is regarded as a danger-signal.

As fœcal matter, and urine especially, contain common salt or sodium chloride, chemists carefully determine the chlorine in all drinking waters, but the limit here cannot possibly be fixed, as salt occurs in all soils, and even in the atmosphere. Two-thirds of the wells that I have examined in the small town in which I live are strongly impregnated with salt (using the word "strongly" in a chemist's sense), and I do not know whether I should refer it to sewage or the natural soil.

Time fails me to discuss the question, how far these limits fixed by the chemist are justifiable, or, in general, how reliable these danger-signals are. It is a question over which chemists, individually and associated, are greatly worried at present. Certain it is that the number of errors made by analysts in their judging and condemning waters has brought discredit on the system in the popular mind.

There is one important adjunct to the chemical analysis which I must not fail to mention, and that is the microscopical examination. This applies not only to the sediment from the water, but to the water itself. Some suitable nourishing medium, as gelatine, is inoculated with a measured amount of the water, and then exposed to a temperature favorable to the growth of the organisms. The number of "colonies" of organisms is then counted, and from that the relative richness of the water in such germs can be estimated. If this were all, it would be of little or no value. The examination must go further, and the microscopist must tell us whether these organisms are pathogenic or not. The purest water will, in a short time, absorb many different kinds of germs, on standing exposed to the air.

I have referred hitherto only to analyses which must be carried out by experts. Are there no tests which can be applied by the general public—the great uninitiated—to distinguish between good water and bad, between the pure and the dangerous? I earnestly wish that there were such tests, but, as yet, nothing sufficiently delicate to insure absolute reliance is known.

We are not without entire approximate rough tests, however, which can greatly aid us. In the first place, we can make better use of the tests with which nature has provided us—the senses of sight, taste and smell. In some cases the senses of taste and smell exceed many times in delicacy the most sensitive of chemical tests.

The water that looks, tastes or smells foul, should be unhesitatingly rejected for drinking purposes. Of course by looking foul one does not mean a merely muddy water. I know a well-water that has been used with effective results, as far as the causing of sickness and fever is concerned, which, when held toward the light, revealed great squirming live things and smelled most abominably after a short standing. And yet that water was used, in spite of such evidence of its pollution. The owner seemed to distrust the evidence of his senses, and asked to have a chemical analysis made. Is it ignorance, or economy, or criminal carelessness that causes such folly?

There are waters which are dangerously impure, and yet reveal this impurity neither to look, taste, nor smell. Sometimes we can still test such by the smell, concentrating the impurity by means of ether in the manner described a few months ago in the *North Carolina Medical Journal*, and then smelling the residue after the ether has evaporated. One can take a pure water and add to it urine in amount too small to be detected by the smell, and still detect it by the ether method. But even this test does not go far enough. And it is easy to surmise that there may be dangerous organic pollution without any smell at all.

There are tests, like the potassium permanganate test, and the silver nitrate test, which go still further in the detection of organic matter, and which can be carried out by those without special training, but they are too indefinite in their interpretation to make it worth while to mention them here.

This is an important field of research for the sanitarian. To find an easy, simple, far-reaching, reliable test for dangerous pollution would be an invaluable discovery. I cannot say whether such a discovery is even possible or not.

As an addendum to this paper, giving some of the salient points of water analysis, it may be useful to mention two methods of purifying water dangerous or suspected of being dangerous. The first and simplest method is that of boiling. While boiling does not remove the organic matter, it destroys the germs and all living organisms, so that the water becomes harmless and can be used without fear. This method, of course, does not free the water from any mineral matter contained in it, does not remove hardness nor suspended matter, and does not necessarily improve it in appearance. As there is loss of absorbed air the water will be somewhat less palatable than fresh water, having a stale taste. If the kettle or vessel used in boiling is not scrupulously clean it also will confer a foreign and unpleasant taste. These objections are not serious enough for one to think of risking his life with an impure water in preference to drinking it boiled, but they do interfere with the general use of boiled water where pollution is only suspected.

The second method of purification is by using alum. An old method, and often used on the large scale, but not generally considered applicable on the small scale. It was only a year or so ago that Dr. Leeds discovered its peculiar efficacy in removing minute organisms A method for using alum on a small scale has been elaborated by Dr. Austen, and was reported in the *Sanitary News* of March 8, 1890.

In the presence of the ordinary calcium bicarbonate of natural waters alum gives a gelatinous precipitate, entangling suspected matter and germs and allowing of their easy removal by filtration. A funnel can be found in nearly every household, or a cheap one can be gotten at the druggist's, along with some cheap filtering paper, and the mode of using it is easily learned. The amount of alum need not, as a rule, exceed two grains to the gallon The alum is best kept in a solution of such strength that a teaspoonful contains a grain. This solution can be made by dissolving 128 grains of alum in a pint of water. "A gallon of water is placed in a clean tin pail and two teaspoonfuls of the alum solution are added. It is then well stirred and mixed with a clean tin dipper. It is best to keep the pail and dipper for this use alone. They should be kept scrupulously clean. After mixing, the water is allowed to stand five or ten minutes and is then poured on to the filter. The first half-pint should be rejected. One filter can be used for several gallons of water, but should then be thrown away. The funnel also must be kept clean." By a little mechanical ingenuity and arrangement of syphons the filtering can be made continuous and self-acting.

I make no mention of the many patent filters so highly recommended. Some are good, some bad, and all dangerous when not properly watched and cleansed.

I cannot close without some reference to the dangers from impure ice. It is well known that freezing does not fully purify water, and by no means destroys the organisms in it. Polluted ice is as dangerous as polluted water. Warning in this direction is especially needed this year, as the past winter was too mild for the ice crop to be gathered from the great rivers of the North with their free-flowing, comparatively pure water. The report is that the ditch, the pond, and the marsh have been skimmed to even partially fill the great storehouses. There may be some exaggeration in this, but there is danger. There is always danger where the lives of the community are left at the mercy of unscrupulous dealers.

I think the Local Boards of Health of the State should make it their duty to enquire into the source of supply of water used in the many ice factories established and proposed, and insist on the best water being used; for unless such watchful care be exercised, these too can become effective agents in spreading disease.

LEPROSY IN THE UNITED STATES.

Its Extent—The Means that should be adopted for its Extermination—The Majority and the Minority Report, and a Discussion thereon at the National Conference of State Boards of Health held in Nashville, Tennessee, May 19–20th, 1890.

REPORT OF THE COMMITTEE ON LEPROSY.

BENJAMIN LEE, A. M., M. D., PH. D., SECRETARY OF THE STATE BOARD OF HEALTH OF THE COMMONWEALTH OF PENNSYLVANIA, CHAIRMAN.

GENTLEMEN:—The undersigned, appointed a committee at the last meeting of the National Conference of State Boards of Health to consider the subject of leprosy in its relation to the United States, beg leave respectfully to report: That since the date of their appointment, the investigations of competent observers in India, the Hawaiian Islands and the West Indies, have been carefully studied, and the Chairman has visited the Island of Cuba in order to satisfy himself as to the actually existent condition in that nearest focus of infection to this country. The principal works consulted have been those of Arch-Deacon Wright, entitled "Leprosy and its Story, Segregation its Remedy;" of Wellesley C. Bailey, Esq., B. C. S., entitled "A Glimpse at the Indian Mission Field and Leper Asylums;" of Arch-Deacon Wright, entitled "Leprosy and Imperial Danger;" of Mr. Edward Clifford, entitled "A Visit to Father Damien," and of Dr. W. Munro, of Manchester, late Medical Officer at St. Kitts, West Indies, entitled "Leprosy." The committee desire to express their special obligations to Mr. Wellesley C. Bailey, Secretary to the Mission to Lepers in India, for his kindness in furnishing them the latest and most reliable information from English sources. The moot point at the bottom of this investigation is, of course, the contagiousness of the disease, and the committee would here put on record their profound conviction, if ever a learned society committed a blunder which was near akin to a crime, it was the Royal College of Physicians of England, when, in order to gratify the vanity of a few doctrinaires and glorify the great British doctrine of free trade in disease, as well as in all other commodities, it adopted the report of the committee which declared leprosy non-contagious, and thus stamped with the seal of its immense authority the most damnable medical heresy of modern times. The complete apathy which followed the promulgation of this declaration in all parts of her Majesty's dominions with regard to the segregation of the disease was as astonishing in fact as it was mournful in results. All precautions were thrown to the winds. Barriers between the clean and the unclean were broken down. And, now, mark! The first of the two works of Arch-Deacon Wright, to which I have alluded, was published in 1885, the second in 1889. In the former he reports the number of lepers in British India at 120,000, in the latter at 131,618, according to the official returns, but adds that those who know India well, place it at not less than 250,000, while many contend that half a million would scarcely cover the number of these unfortunates. And here let us say, parenthetically, as a fact which comes very near home to us, that Dr. Leloir, clinical professor of diseases of the skin at Lisle, and author of a "Traite Partique et Theorique de la Lepre," expresses the belief, as the result of his observations and inquiries, that there are more lepers, in proportion to the population, in the West Indies, than in the East Indies. Such are the consequences of the non-protective policy in leprosy. Now let us glance for a moment at an experiment in the opposite direction. The government of Norway, where the disease was an actually present evil, did not allow itself to be carried away by the new-fangled theory of the English dermatologists. On the contrary, it not only continued to keep its leper population under the strictest surveillance, but added new restrictions, making the segregation of a leper compulsory, absolute and permanent from the moment of the discovery of the disease. Here again note the result: In the year 1857 there were in Norway, at the beginning of the year, 2,863 cases, while 242 new cases were discovered during the year. In the following year the number had fallen to 2,794, with 235 new cases. In 1860 the number reported was 2,819, with 226 new cases. Ten years later it had fallen to 2,619, with 160 new cases; and ten years after that to 1,717, with only 29 new cases. Thus, in twenty-three years, the number of lepers has been reduced from 2,863 to 1,717, while the number of new cases has fallen from 242 to 29, a diminution of eight-ninths, indicating with mathematical exactness, the possibility of its complete extinction at no distant day. In view of this positive demonstration from both sides of the question, namely, the rapid extension of the disease when a full intercourse is allowed, and its as rapid diminution when the isolation is insisted on—in view of the fact that most reliable and painstaking observers who have personally watched the disease in all its phases for years, not getting their knowledge afar off, and by hearsay, have almost universally abandoned the doctrine of the heredity of the disease, and, moreover, have proved by the most careful experiments that it is very rarely conveyed by inoculation—the Royal College of Physicians certainly owes it to humanity and to the medical profession, in whose sacred name it speaks, to recant this heresy in the plainest language and the most complete manner.

It is not enough that, stimulated by the interest shown by the Prince of Wales as President of the "Father Damien Memorial Fund," the college should urge the government to "institute a full and careful scientific investigation of a question which, in the interest of humanity, calls for immediate attention." There is no time to waste in a useless and long drawn-out scientific investigation. There is ample information on which to base an opinion, and that opinion exactly the reverse of that to which the college has already given world-wide expression. Common honesty requires that it should confess its mistake as publicly as it made it. The extent to which this dogmatic utterance on the other side of the ocean has dominated medical opinion in this country is indicated by the fact that since the last meeting of this Conference a number of the most prominent physicians in Philadelphia have united in publicly rebuking the Board of Health of that city for enforcing its regulations for the reporting and segregation of the disease.

Before considering the subject in its intimate relation to this country, let us glance for a moment at the present distribution of the disease throughout the world. In Europe, we find it, as already said, in Norway, to an extent which has compelled the government to exercise the most careful measures for the segregation of its victims. In Sweden a few cases are known to exist. In Iceland there are about one hundred cases. In Russia it is making its way stealthily along the shores of the Baltic, in Esthonia, Livonia, Gourland, Finland, Cherson, the Crimea, and among the Cossacks of the Ural, being prevalent in the Caucasus, the Delta of the Volga and Astrakan. A few lepers are found in Austria. They abound in Constantinople, and are found in Macedonia, Thessaly, Crete and other parts of the Sultan's dominions. The disease is decidedly on the increase in Greece and the Archipelago. A few lepers are found in Malta. In Italy there are a few cases in every public hospital, and not less than a hundred in the Island of Sicily. In Spain they are scattered over all the Southern Provinces, Catalonia, Valencia, Andalusia and others, making it necessary to establish leper hospitals at Granada and Malaga. The mountainous district of Lafoes, in Portugal, contains a large number, and there is a leper-house at Lisbon. In France it has its fixed home in the Rhone district, along the shores of the Mediterranean, and at Nice, and fresh cases are constantly occurring in families previously unaffected. Traveling eastward, we find it in Asia, as follows: Lepers swarm in Arabia, Syria and Palestine. Jerusalem has a leper hospital. It is very common in Persia. In Asia Minor its presence is evidenced by the fact of a leper hospital at Scutari. We have already alluded to its immense prevalence and fearfully rapid spread in British India, under the fostering care of the Royal College of Physicians. In Indo-China we meet it extensively in Burmah, Siam and Malacca, and not less so in the French Colonies In China proper, the lepers are almost innumerable. Leper-houses are as common as they were in England four hundred years ago, and that is saying much. In the city of Canton alone there are between three thousand and four thousand cases. They are numerous in Japan, the Indian Islands, Kamschatka and the Aleutian Islands. Proceeding now to the great dark continent, on which our illustrious compatriot has been recently throwing a ray of light, we find many in Egypt, Abyssinia, Darfur and Senegambia, and, on the coast further south, many, with an alarming tendency to increase at the Cape of Good Hope; some on the west coast and in the Islands of Madeira, the Azores, St. Helena, Madagascar and Mauritius. In the Pacific we find it in the Sunda and Philippine Islands, and the fearful story of its introduction and rapid spread in the Sandwich Islands, until every fifteenth of the population is a leper, is familiar to us all. Chinese and Indian immigration has introduced it into Australia. Still continuing across the Pacific, we find it firmly established in California, whose representatives in in this Conference gave us timely warning at the last meeting. Lepers are numerous in Mexico, Central America, Ecuador, Venezuela, Uruguay. They are numerous in French and British Guiana. Leprosy is rife in many provinces of Brazil, hospitals being found in five different cities. The Antilles are full of it. Jamaica contains from seven hundred to eight hundred lepers. In Barbadoes the population has increased six per cent., while lepers have increased twenty-five per cent. In the North American Continent we already find cases of the disease in Greenland, in New Brunswick and in British Columbia; and, in the United States, in Minnesota, Wisconsin, Michigan, Oregon, South Carolina, Louisiana, Texas and Florida, and, as before noted, in California. We are warranted, therefore, in the assertion that leprosy is cosmopolitan. No pent-up Utica confines its powers. It makes naught of latitudes or of altitudes. It spares no age and respects no race. The Anglo-Saxon the Teuton, the Sclav, are susceptible to its contagion, as well as the Hindoo and the Sandwich Islander. Witness Father Damien, so long the show-card of the non-contagionists, now lying in a martyr's grave under the frowning shadow of Molokai. Let us not take refuge in a fancied immunity due to climate or parentage. They will prove but broken reeds to pierce us as we lean upon them. We have, as has been shown, leprosy to north of us, leprosy to south of us, leprosy to east of us, leprosy to west of us. We have even a few centers of infection within our borders. These, however, are as yet insignificant. If proper precautions are taken, they will cease to exist in the course of a generation. In view of the situation, what is the part of wisdom? Two courses are open to us. First, the do-nothing policy, which has prevailed until nearly the present time. The result of this will be that, in fifty years, there will be lepers in every hamlet, and leper-houses, crowded with their mutilated victims, in every city. Second, the policy of absolute and implacable segregation in the case of those who are already fairly domiciled in the country, the prohibition of marriage to all lepers, and the prohibition to all uninfected persons of the inhabiting of infected houses; and, with regard to foreign lepers, the policy of absolute and implacable exclusion. With the adoption of these measures, which, undertaken at this time, will entail very little hardship and will not be difficult of execution, there are those now living who will see the day when there shall not be a leper in the land. How shall the principal of segregation be practically carried out? Those who have given the subject the most careful study believe that careful investigation would bring to light lepers hiding in every State in the Union. Shall every State, then, establish a leper-house? Common sense cries out against such an absurdity. Shall each State set apart a leper-ward in a general hospital? Humanity forbids the incurring of such a risk. One, or at least two, colonies would accommodate all the lepers on the east side of the Rocky Mountains, and the same number would be sufficient for those on the other side. Such a colony already exists in Louisiana. There are lepers enough in Wisconsin and Minnesota to warrant the establishment of one in that section of the country. Let those States deed the land occupied by these leprous communities, or which may be set apart for them, to the United States, and let every leper, no matter what his wealth or his social position, be removed to one of these colonies. Let every provision be made for the care and comfort of the colonists, but let the separation of the sexes be absolute during the genetic period of life. To every house in which lepers have lived, which is not within the limits of the colony, let the torch be applied, or, should this be impossible, let the most thorough disinfection be employed, not forgetting the Mosaic precaution of scraping the walls. How shall the policy of absolute and implacable exclusion be carried out? It is probably safe to say that there are not half a dozen physicians in the United States who would recognize a case of leprosy in its earlier stage. But, in order to make quarantine effective, it is essential that there should be an expert in leprosy at every port of entry at which passengers arrive from infected countries. If the government cannot find such, it should select men for the purpose and send them to Havana to study the disease. All immigrants from leprous countries, and all Americans who have been domiciled in leprous countries, as, for instance, the Sandwich Islands, should be stripped and every inch of their bodies subjected to the most rigid scrutiny. In prompt compliance with a suggestion made at the last meeting of the American Public Health Association, the Supervising Surgeon-General of the United States Marine Hospital Service has issued an order looking toward the exercise of a rigorous quarantine against this disease, of which the following is the text:

To Medical Officers of the Marine Hospital Service, Collectors of Customs and others concerned:

The National Quarantine Act, approved April 29, 1878, entitled "An act to prevent the introduction of contagious or infectious diseases," provided that no vessel or vehicle coming from any foreign port or country where any contagious or infectious disease exists, or any vessel or vehicle conveying persons or animals affected with any contagious disease, shall enter any port of the United States, or cross the boundary line between the United States and any foreign country, except in such manner as may be prescribed.

Attention is now directed to the increased prevalence of the contagious disease known as leprosy in several foreign countries, and the danger of its increase in the United States through the immigration of persons affected with leprosy; and, by direction of the Secretary of the Treasury, the following regulation is framed under authority of the foregoing act, subject to the approval of the President, to protect the people of the United States from the introduction of leprosy:

1. Until further orders, no vessel shall be admitted to entry by any officer of the customs until the master, owner or authorized agent of the vessel shall produce a certificate from the health officer or quarantine officer at the port of entry, or nearest United States quarantine officer, that no person affected with leprosy was on board the said vessel when admitted to free pratique, or, in case a leper was found on board such vessel, that he or she, with his baggage, has been removed from the vessel and detained at the quarantine station.

2. Medical officers in command of United States Quarantines are hereby instructed to detain any person affected with leprosy found on board any vessel, but such officer will permit the departure on out-going vessels of persons detained at quarantine in pursuance of this regulation, provided such vessel shall be bound to the foreign country from which the said leper shall have last sailed.

JOHN B. HAMILTON,
Supervising Surgeon-General,
Marine Hospital Service.

Approved: WILLIAM WINDOM, *Secretary.*
Approved: BENJ. HARRISON.

[*From Dominion Report of Department of Agriculture for 1889.*]

A very interesting report on the Leprosy Lazaretto at Tracadie, N. B., is given by Dr. A. C. Smith, the visiting physician at that institution. He reports twenty persons suffering from that disease and in the Lazaretto, five new cases having been admitted since the last report, and three deaths having occurred during the year. Leprosy, he states, is dying out in Tracadie, but, as cases were reported appearing in the neighboring institutes, Dr. Smith made a special tour of inspection, which resulted in his finding a focus of the disease between Caraquet and Shippegan, and he traced from this center several cases to other settlements. He strongly urges permanent measures of segregation as the only means of stamping out this loathsome disease. It would appear, from the tenor of his report, that there is some reluctance on the part of persons in suspected houses to allow the inspecting physician to enter them for the purpose of examination, and he strongly urges legislative action to assist segregation of the disease, not only in the interest of those living in affected districts, but to prevent the spread of leprosy, a subject forcing itself on the attention of the world at large.

(Signed) I. CARLING, *Member of Agriculture.*

Dr. Reeve presented a minority report from Dr. Hoegh, who, he said, was a Norwegian, who had had exceptional facilities for studying leprosy. His father was Surgeon in-Chief of the Norwegian hospitals, and Dr. Hoegh was in the habit of seeing the disease there. After coming to this country he had studied the subject, and was acquainted with nearly every case of leprosy that has come here from Norway. The report is as follows:

REPORT OF THE MINORITY OF THE COMMITTEE ON LEPROSY.

BY DR. KNUT HOEGH.

The undersigned member of the Committee on Leprosy is unable to subscribe to the report formulated by the chairman and the rest of the committee with the recommendations for the prevention of the spread of the disease, and takes the liberty of submitting the following minority report:

While it is admitted that leprosy is a contagious disease, it is held by the undersigned that the danger of contagion is very much exaggerated in the majority report; and that we shall, in all probability, be able to exterminate the disease in the United States without having recourse to measures which are unnecessarily severe, and which disregard the ordinary rights of the diseased individuals. To deprive an individual, who has committed no crime, of his property, to shut him up in an asylum for life, to prevent him from forming legal marriage, and even to extend this draconic law to his relatives who have not shown any sign of disease, as the majority of the committee proposes, seems to be the height of cruelty and injustice.

It is a matter of common observation that laws in opposition to the sentiment of the community are poorly enforced, and fail in their object. If lepers are to be treated as criminals, communities are not apt to furnish juries that will accept physicians' statements as to the presence of the disease in any legal case. This will be much more probable in a country where, according to the expression of the majority report, very few physicians are familiar with the early stages of the disease.

A further disadvantage of too rigorous measures will undoubtedly be that lepers will hide their disease, and that their friends and families will help them to elude the vigilance of the sanitary officers. In this way the disease will have a good chance to spread unobserved and uncontrolled.

If the disease were as easily communicated as small-pox or measles, there might be some excuse for absolute isolation; but there are facts enough to prove that it does not spread from the diseased to the healthy, except under circumstances of close personal intimacy. In relation to this side of the question, it must be permitted to call attention to the fact that by far the majority of leprous married persons fail to give the disease to their spouses, and that only a minority of the children in leprous families become lepers. This fact can be easily ascertained by anybody who will peruse the official reports of the Surgeon in-Chief for the leprous disease to the Government of Norway.

It appears, furthermore, from these reports that lepers who for half a century have occupied hospital wards in common with other patients in Norway, both in Lunggegaards hospital in Bergen, and in Rigs hospital in Christiania, never have communicated the disease to any of the other hospital patients; nor during this long period, in which from one to four leper asylums have been in activity in Norway, has any attendant, washwoman, nurse, or physician taken the disease from any of the patients.

It seems that facts like these prove that the disease can be controlled without incarcerating its victims.

Much is said about the stern policy of the Government of Norway. Let it first be observed that what we are apt to understand by the Government, viz., its executive branch, has no more right to promulgate laws in Norway than in the United States. The legislature makes the laws very much as it does in this country, and the laws regarding leprosy have never made segregation compulsory, absolute and permanent as the majority report states.

Before 1885 nobody could be compelled to enter a leprosory. Lepers were not separated from their families. They were simply enumerated, and the official physicians were ordered to visit them and assist them with advice and medicine. It is probable that the advice usually comprised, among other things, an admonition to avoid close relations with healthy people, and to enter asylums, where the domestic conditions were very unfavorable.

In 1885 a law emanated giving the parish boards the right to compel *pauper* lepers to enter the asylums; but married paupers could not be separated from their wives or husbands, if they objected to such a separation. Lepers who were not paupers can, according to this law, not be compelled to leave their homes and families; but the local Boards of Health are by this law empowered to regulate the domestic arrangements in leprous families in such a way as the boards may find proper. This practically amounts to this: That the Boards of Health demand that lepers in their jurisdiction shall be provided with separate beds, and that they must have their own separate untensils and clothes.

Leper paupers that are married *may*, if the parochial priest, the official physician, and the high sheriff of the county unanimously so decide, be separated by sending the diseased to an asylum, and lepers who disregard the rules given by the sanitary authorities may also be compelled to enter the leprosories. It will thus be seen that lepers are not compelled to leave their homes, *except* when special reasons, such as gross carelessness and disobedience of the rules of the local Health Boards make the patients more than usually dangerous for the public health.

In former times it was by no means uncommon that healthy children shared bed with lepers; and it is known that it has happened within the last ten years that articles of bedding and clothing that had belonged to deceased lepers have been distributed to the poor.

These facts probably prove that the compulsory, absolute, and permanent segregation made by the Government of Norway, and to which the rapid diminution of the disease is attributed, in the majority report, is very materially different from the measures proposed by the majority of the committee.

The number of lepers in Norway in 1856 was about 3,000; in 1889 about 1,000—a decrease in a third of a century of sixty-six per cent.; an average yearly decrease of about sixty lepers. If this goes on at similar rate the next generation will see the last leper in Norway. To what can these happy results be ascribed? Clearly not to segregation in hospitals, as the percentage of the total leper population in Norway which was in the asylums has varied between twenty-nine and thirty-nine per cent., respectively, in 1866 and 1883. Nor can it be ascribed directly to emigration, as there emigrated to 1886 only sixty-seven lepers according to Government statistics. To this number I have been able to add nearly one hundred cases who developed the disease after their arrival in the United States. But this number is clearly too small to account for the rapid retrogression of the disease. The most probable answer to the question of the cause seems to be the following: From the beginning of the fifties, public attention was directed to the disease; cases were enumerated and became known as lepers, and people had, in this way, the means of avoiding close contact with them. The town boards did what they could to improve their miserable hygienic conditions, but the most important factor is, undoubtedly, the general improvement in the habits and comforts of the people. Houses are better; there are more beds and clothes, and more personal cleanliness.

It has been necessary to dwell upon the contemporaneous history of leprosy in Norway to such an extent, because the majority report bases very largely its conclusions and recommendations upon the fact that the disease has diminished in Norway. It is to be regretted that the actual circumstances were not better known and better understood. The majority report adduces some statistics from India. Inasmuch as it admits the gross unreliability and defectiveness of these statistics, it is difficult to see how they can be used for any scientific purpose whatever.

The rapid extension of the disease in Hawaiia shows how the disease will spread amongst a primitive people with defective appreciation of personal cleanliness, something that is not denied. If lepers are allowed to dip their food with their fingers out of a common receptacle with other people, it is evident that an avenue is open for contagion; and this and many similar habits, different from those of the white race, are cultivated on the Hawaiian Islands.

By examining the geographical extension, and the history of the advance, and the disappearance of the disease, one fact must attract attention, and that is, that it is most prevalent in the less civilized countries and in such localities where a very poor population lives in squalor and filth. It has, from the early dawn of history, been prevalent in India and China, and in those countries it exists yet as much as formerly. It was once extremely common in Europe, but now it has disappeared from most of the European countries, and it has disappeared first in the centers of civilization, lingering along in the remote regions. For instance, in France it existed in Auvergne, Bretagne and in the mountains of the south in the beginning of this century, while it had disappeared from the rest of the country. In Norway it is exclusively a disease of the lower orders, never attacking the better-situated classes.

In regard to the history of leprosy in the North-western States, the writer of the report will say that he is tolerably well familiar with it. Through circulars sent to ministers, merchants, physicians and other prominent men among the Scandinavians, nearly every case that has been known and recognized was investigated. Since the beginning of the Scandinavian emigration, probably less than two hundred lepers have come to this country. Less than twenty live to-day, spread through the North-western States. Not one of the now living known lepers was born in the United States. The children and grandchildren of deceased lepers, of whom many now live amongst us, have remained free from the disease, which has never appeared in any of them. No instance is recorded or known where any native of this country has been contaminated by any of these immigrants. In view of these facts, it does not seem permissible to indulge in the alarming view of the majority of the committee, who believe that, if we do nothing, "in fifty years there will be lepers in every hamlet, and leper-houses, crowded with their mutilated victims, in every city." In the present state of civilization in the northern part of the United States, it seems as if the disease does not find those special conditions which it requires for its extension, and, with the most ordinary care, it ought to be possible to stamp it out, not only in the solitary instances where it is found in the North-west, but also in California and the South.

In accordance with the views above given, the following practical recommendations are respectfully submitted:

1st. Leprosy immigrants should not be allowed to become domiciled in the United States, but be sent back to their respective countries. With the closure of our ports to the immigration of the Chinese, the danger of the importation of the disease from China has ceased. As the Norwegian government has very accurate information about its lepers, it will be an easy matter to guard against the introduction of leprosy from Norway, as the Norwegian government probably will give its willing co-operation. As long as there are reported no cases of leprosy imported from the West Indies, it does not seem necessary to organize any board for the personal inspection of these immigrants we may receive from those countries.

2d. The lepers that we have the misfortune to have among us should be under the control of the sanitary authorities to this extent, that no leper should be allowed to sleep in the same room, far less in the same bed, with a healthy person. He should have his separate clothes, towels, bedding, dishes and other eating utensils. He should not be allowed to enter public halls, churches, theatres, schools and similar places where people congregate promiscuously; nor should he be allowed to use public beds in hotels, sleeping-cars or steamers. He should not be allowed to travel from his home except under permits from the sanitary authorities. It should be the duty of every physician who becomes aware of the existence of a case of leprosy to report it immediately to the proper sanitary authorities. The families of lepers, or others who have been in contact with them, should be examined once every year by a competent physician, under the orders of the sanitary authorities, with a view of the early detection of new cases.

KNUT HOEGH.

Dr. Bryce, a member of the committee, in explaining his position on the subject, said: "I think I stated in a letter to Dr. Lee, that, while agreeing with the general terms of the provisions which he proposed, I still thought, with regard to the humanitarian side of the question, that any government undertaking any such extreme measures would, of necessity, be expected to give every provision possible for the comfort of those people in their segregated condition. I am glad to know that the report of Dr. Hoegh, which has been presented by Dr. Reeve, gives us a more pleasant view of the contagiousness of the disease than we had a right to suppose from general literature. I have placed it along the line somewhat of tuberculosis I think biological examinations of the disease show it to be very largely a growth similar, in its slowness and some other characteristics, to tuberculosis. During recent years we have received much light upon a disease which, eight years ago, was deemed non-contagious by a large majority of physicians. There is no one to-day who would say that tuberculosis is not a contagious disease. In Italy, isolation has been provided for this class in all communities. I am not prepared to say, and do not think the public sentiment of this country is ready to say, that those afflicted with tuberculosis are to be separated from the rest of the community. There are many things entering into this question, and the dangers of tuberculosis may be greatly lessened, indeed. But, while that is true, and while the report presented by Dr. Reeve may be largely true—for I suppose the gentleman is fully aware of the matters on which he speaks—we are in a peculiar position. We are comparatively free from the disease, and we do not want it to have a foot-hold. We do not wish to take the chances of its increasing here.

"Our cities and towns are growing with enormous rapidity, and it may be that twenty years hence the conditions existing may be such that the disease can be dealt with effectually only by extreme measures. It seems to me that if we err on the side of severity, common prudence demands that extreme care be taken at once that the 30 or 40 or 100 cases now on United States soil should be segregated, and placed in homes as in New Brunswick, where they can be treated with the greatest kindness. In view of these two reports from two eminent authorities, I think I may be excused for having signed a report which may seem to place me in a position of recommending a harsh measure for a disease which to-day may be trifling, but which fifty years hence may be alarming."

Dr. Salomon, in discussing the reports and the question proposed by the State Board of Pennsylvania, What steps should the United States Government take to prevent the introduction of leprosy into this country? said: "As I was appointed to open the discussion on this question, I would like to say a few words. I have not prepared anything on the subject submitted, because I think that the rules as adopted by the United States Treasury Department, which have been read, are sufficient for the purpose; I think they are working well, and as regards the question proposed by Pennsylvania, I think the desired end can be accomplished by the methods now in use. But while upon the report of the committee, I would beg to state that I cannot altogether agree with Dr. Lee. I think his views as to the contagion of the disease are somewhat exaggerated, and I agree to a large extent with the paper read by Dr. Reeve. I have taken quite an interest in this disease, as we have had it in Louisiana for quite a long time, and in the beginning of the century we had a leper colony in that State. I have made it my business to investigate those cases at St. Martinsville in the Teche country. This town, with the exception of New Orleans, is probably the oldest in the State of Louisiana. It was formerly the centre of refinement of the French-speaking people. It is situated on the Teche bayou in a fine country, and here the wealth and refinement of New Orleans congregated. In 1798 a woman from San Domingo found a refuge in St. Martinsville from the disturbances of her country. After she had advanced somewhat in age, been married and had one son, she manifested symptoms of leprosy. She was the only case there at that time, 1802. Two years ago I was shown the spot on the Teche bayou where her hut was built; she was separated from the community and placed in this hut. Food was brought near her house, and she would come out and get it and then go back. She was not allowed to come in contact with any inhabitant. Her son grew up to manhood, and died, between the ages of 60 and 70, as the certificate shows, of heart disease. He may have had leprosy, though it never actively manifested its presence. Two years ago there were nine cases of leprosy in St. Martinsville, and every one was a lineal descendant of the old woman who died in the hut on the banks of the bayou, and the descendants of one grandson. No other cases were there. While I was a believer in the contagion of the disease, this went far towards changing my opinion; I began to believe in the heredity of the disease. Some of these parties were married, two of the women living with their husbands. One had been married two years, and the others seven or eight. Their husbands showed no signs of the disease. In one of the families there were five children, and three of them had leprosy; in the other family there were three children, and one had leprosy. I questioned the oldest inhabitants of the place, and saw an old woman over a hundred years old who knew the woman who brought the disease to the place, and the only case of leprosy which existed outside the descendants of this original case was in a negro man who had waited upon and even slept in the same room with the grandson of this woman, who was the grandfather of the present generation of lepers, and, when his employer or master died, his clothing descended to this negro servant, and he contracted leprosy. This went to confirm my theory that leprosy is a contagious disease, but contagious by inoculation. I do not believe that, unless you come actually in contact with a leper and are inoculated, you will contract the disease. In the Charity Hospital at New Orleans, in twenty years' experience, there has been a leper-ward and there have been from two to seven cases there. None of the attendants or other patients in the hospital have contracted the disease, and there is only one instance where the disease was contracted by an outside person, and that was in the case of a Catholic priest who was in the habit of visiting these lepers. He told me he believed that he caught the disease from handling the patients. He died with it. Therefore, I say that the cases presented by Dr. Lee, I think, somewhat exaggerated. I am speaking from my own individual experience and observation, particularly in St. Martinsville, where there were at one time a population of five thousand or six thousand. There is no history of a leper having existed there except in this particular family, and we went to almost every house in the town with every physician in the place. They informed us of every case, and took us to see a number of the reported cases that were not cases of leprosy."

Dr. Lee asked if that was the only center of leprosy in Louisiana.

Dr. Salomon replied that there were some few scattered cases in the south-western part of the State, in the parish Lafourche; also a number of scattered cases in New Orleans, seven or eight of which he had seen himself.

Dr. Lee said there was a recent report issued concerning the number in New Orleans, and it was quite large.

Dr. Salomon said: "Yes, it was made by Dr. Bland, who now occupies the position of Chief Sanitary Inspector for the Board of Health. He claims to have found something like forty cases in New Orleans. I think this number is exaggerated. I was taken to see a case of elephantiasis, which was called leprosy. It would be a fair statement to say there are between twenty and twenty-five, including the six or seven in the Charity Hospital in New Orleans. I went to see a case in the rear of the fashionable portion of the town, in the person of a German boy eight years of age. It was a well-marked case of tuberculous leprosy. He had had it, his mother told me, three years. There were three other children in the family. I saw father and mother and grandfather, and all were healthy. His mother told me she had never seen any disease like her son had, and she was satisfied her son had not, and its origin is hard to tell. Eight or ten blocks away I saw another case, in the person of an old German woman of about sixty. She was unable to say where she got it, and said she had never seen anything like it. I speak particularly of St. Martinsville, because I took special pains to make an investigation."

Dr. Ruggles, of California, read some extracts from a paper on this subject by Dr. Orme, of California.

Dr. Salomon moved that the Conference answer the question proposed by the Pennsylvania Board, by saying that the measures taken by the United States Government to prevent the introduction of leprosy into this country are sufficient.

Dr. Lee discussed the motion as follows: "It is admitted by Dr. Hoegh that a minority or small proportion of the children of lepers acquire leprosy. It seems to me that that admission alone takes most of the force out of his argument. Shall we let lepers marry and propagate leprous children? In the next place, the humanity which is seen in hospitals and the extreme care which is taken in treating lepers, together with the scrupulous cleanliness which I observed, particularly in Havana, makes it an impossibility for the buildings, or even the clothing, to become infected. Outside the hospital we have, in a greater degree, the contagious agencies of filth and carelessness, and it is reasonable to suppose that immunity would reside in a hospital when it would not in a dwelling, and especially in the dwellings of the poorer classes. The minority report made allusion to the Hawaians as being an unclean race. It is well known that they spend most of their time in the water, and if there is a clean people, so far as physical cleanliness goes, it is the Hawaians. Dr. Salomon's conclusion that leprosy is hereditary and not contagious, is not supported by any who had studied the subject on a large scale, and it is conceivable in the case which he mentions that contagion was taken from the infected house and clothing, and it is not necessary to suppose that it was communicated through an abrasion of the surface, any more than the clothing which contains germs of small-pox or yellow fever must be supposed to convey the disease through an abrasion. The report of the minority throws some doubts on the statistics of the majority report. Those statistics are governmental statistics and should be corrected, in so far as they show an immense increase in the disease. The only figures given which were not governmental were those of observers in India. I concede that the government did not observe them all, but the figures are correct as a minimum, if not as a maximum. As regards the regulations which the minority report would substitute for those proposed in the majority report, I desire to ask whether any member of this Conference, finding himself or a member of his family a victim of leprosy, would not prefer to have himself or member of his family in a well regulated institution, with proper medical attendance and every comfort, rather than to have a government inspector coming every few days to his house to see whether he slept in the right bed or was fondling his children too much? As far as I am concerned I would not allow such inspectors in my house, but would very willingly submit to segregation, and would send any member of my family to a colony. But this supervision, to see what you eat out of or whether you sleep with your wife, seems to be inhuman."

Dr, Reeves said: "I wish to say, in reply to Dr. Lee, that I did not understand Dr. Hoegh to throw discredit on the statistics, but upon the conclusions arrived at—that in four or five years the number of lepers could have increased from 120,000 to half a million. It would be an entire revolution of the ideas that have been held, to believe that such a change could have taken place in that length of time. In Wisconsin we have four cases, perhaps five. We have a case which has been reported, but which has not been fully determined. The disease has existed there for several years, and not a case has resulted in the State from contagion, though the families have not been separated at all. In the last four years there has been no effort made to separate these, and no cases exist there whose origin cannot be traced to Norway. Two hundred lepers came to this country from Norway and settled in the North-west, and now not more than twenty remain. The rest have died."

Dr. Salomon's motion was carried.

Dr. Lee offered the following resolution:

Resolved, That this Conference respectfully requests the President of the United States to instruct the Secretary of the Treasury to amend the rule of a recent law for preventing the spread of contagious diseases from one State to others so as to limit the operation of such rules and regulations to such States as may, through their constituted health authorities, ask for national assistance for their own States.

Dr. Cochran thought a committee should be appoined to consider whether the resolution conflicted with the act passed by Congress March 28th.

The President stated that the resolution had been drawn in accordance with that act.

THE PURIFICATION OF WATER BY MEANS OF METALIC IRON.

BY MR. EASTON DEVONSHIRE, ASSOC. M. INST. C. E., ENGLAND.

The purifying properties of the metal iron, and its beneficial action in the natural soil are well known. I desire to explain to you a method by which these natural properties can be artificially applied to the purification of water. The great need of some practical method of restoring to their pristine purity sources of water-supply, which have become elements of danger and causes of disease to the numerous cities and populous centres which are dependent upon them for the first and greatest of their daily requirements is, I think, sufficient apology for bringing the subject of my paper before your honorable Institute.

Dr. Medlock was probably the first who endeavored to make practical use of metallic iron as a purifier of water. He took out a patent in 1857 for a process in which iron wires or plates were to be suspended in tanks through which the impure water was to pass. In 1867, Dr. Thomas Spencer brought out a material which he named magnetic carbide, in which iron was the active reagent. Little, however, was accomplished on a practical scale previous to the invention by Professor Gustav Bischof, of the material known as spongy iron.

Spongy iron is produced by heating hematite ore to a temperature of a little below that of fusion, and thus rendering it porous or spongy in form. Dr. Bischof's material has long been utilized in domestic filters, and the spongy iron filter is at the present time second to none in its remarkable purifying properties, and in the permanence of its action during the whole period that the mass of the material remains porous.

In 1879, when a concession was obtained by an English firm for the construction of water-works to supply the city of Antwerp in Belgium, it was found that the only available source of supply was of such a nature that some method would have to be adopted to improve its appearance sufficiently to compete with that of the shallow well-waters with which every dwelling in Antwerp was provided. The river Nethe, a tributary of the Scheldt, was the source selected. The water of this river is subject to various deleterious influences. It is colored with a yellow color, exceedingly difficult to remove, by the peaty nature of the country through which the river flows. It carries down at times large quantities of silt and finely divided clay. Being subject to the influence of the tide, it is affected by sewage pollution, both above and below the point where it was necessary to establish the intake of the water-works.

The commercial value of such water in a city so amply supplied with wells as Antwerp, was from the first recognized by the concessionnaires of the water-supply as being very small, and it was decided to endeavor to artificially improve the water before sending it into the city. Bischof's spongy iron was the material selected as the most likely to give the desired results, and in 1879 an experimental spongy iron filter was erected at Waelhem, the site of the proposed works. Experiments were carried out on a considerable scale for several months, and gave most remarkably successful results, the impure and discolored water of the Nethe being changed into a bright, sparkling and chemically pure liquid. As a result of these experiments, permanent works were at once commenced, embodying Professor Bischof's process. Three pairs of filters were constructed, each pair consisting of an upper basin containing a mixture of spongy iron and gravel three feet in thickness, and a lower basin containing a bed of river sand two feet thick. The river water was pumped into the upper basin, flowing through the bed of spongy iron on to the sand filter, where the oxide of iron was retained.

The chemical results and the great improvement in the appearance of the water were all that could be desired, and for nearly two years it seemed that a practical process of purifying foul water on a large scale had been found. After a time, however, as the demand for water increased in the city, and the filters were required to approach their calculated output, it was found that the mass of the spongy iron mixture was caking together and becoming daily less porous. Matters at length became so serious that it was with the greatest difficulty that sufficient filtered water could be obtained to meet daily requirements. The spongy iron beds had to be dug over by manual labor, so as to loosen the material and restore in some degree its porosity.

After many expedients had been tried to overcome the mechanical difficulty of working these otherwise most efficient and valuable filters, it was pointed out by Sir Frederick Abel that means should be sought to keep the particles of iron in movement, so as to prevent their cohesion and also to maintain their surfaces clean and active.

The Consulting Engineer of the works, William Anderson, at the present time Director-General of Government Ordinance Factories in England,* after many experiments, hit upon the simple and ingenious plan of accomplishing the desired end by the invention of the apparatus known as the *Revolving Purifier.* Instead of allowing the water to flow downward through a motionless mass of the purifying material, Mr. Anderson adopted as the principle of his invention *the showering down of finely-divided particles of the purifying material through a flowing stream of water.* A reference to the diagram will render the explanation of the apparatus easy of comprehension.

The apparatus, as shown in the diagram, consists of a cylinder *A*, supported in a horizontal position by hollow

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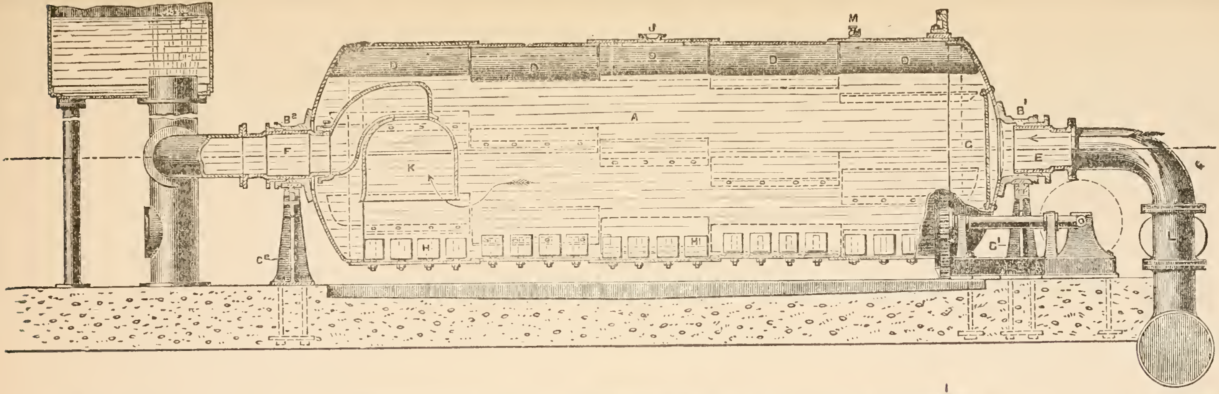
* Consulting Engineer to the Royal Agricultural Society of England, Member of Council of the Institution of Civil Engineers and of the Society of Arts, etc.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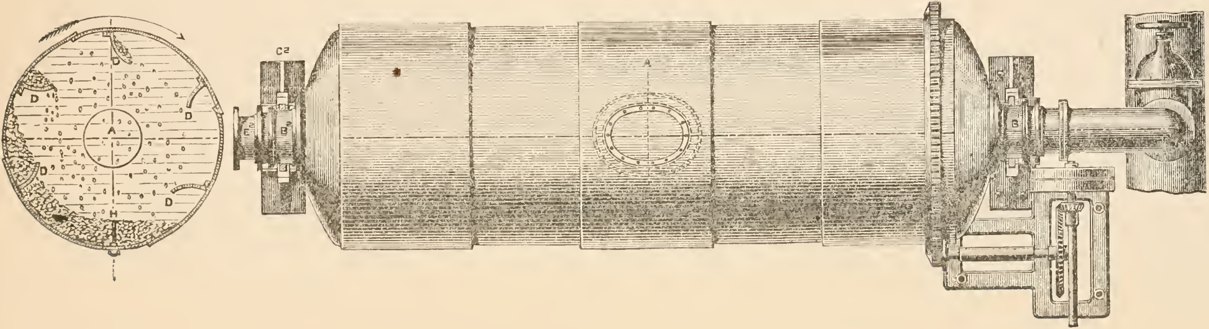
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trunnions $B' B^2$, which are capable of revolving in pedestal bearings $C' C^2$. Attached to the internal periphery of the cylinder is a series of short, curved shelves *D D D*, arranged either in horizontal or diagonal rows at equal distances. A six row of curved shelves is replaced by a line of small square plates *H H H* which, by means of nuts outside the cylinder, can be set at an angle with the axis of the apparatus. By regulating the inclination of these plates, the shower of iron can be directed back to the inlet end of the purifier, and the tendency of the flow of water to carry forward the purifying material counteracted. Inlet and outlet pipes, *E* and *F*, enter the hollow trunnions and admit and discharge the water to be purified. As the water enters the cylinder it strikes against the circular distributing-plate *G*, and is caused to flow radially through an annular space five-eighths inch or three-fourths inch in width, the formation of a central current along the axis of the purifier being prevented by this means. The inner end of the outlet pipe carries an inverted bell-mouth *K*, which catches the fine particles of the iron carried forward by the water, and causes them to fall again to the bottom of the cylinder. One end of the cylinder is encircled by an annular spur-wheel *I*, worked into gearing through which a slow rotary motion is given to the apparatus. On being started to work, sufficient metallic iron to fill one-tenth of the cylinder is introduced through the manhole, the iron being in a suitable state of subdivision. The purifier is then filled with water through the sluice-cock *L*, the air-cock *M* being left open to allow the cylinder to fill completely. The apparatus is then set in motion, the rate of rotation being about six feet per minute at the periphery. The effect of the rotation is to scoop up the iron particles and to shower them down through the flowing water.

When designing the original spongy iron filters, at Antwerp, the calculations of their size and capacity were based upon the opinion that, in order to obtain the best results, a contact of forty-five minutes between iron and water should be allowed. Following this idea, Mr. Anderson commenced by placing spongy iron in his revolving purifier and regulating the speed at which the water flowed through the cylinder so as to obtain a contact of forty-five minutes. It was at once evident that under these conditions the apparatus would have to be of such a size as to render it impracticable for any but small volumes of water. Experiments were therefore made to see whether the contact might not be shortened and, to the surprise of all concerned, it was found that a contact varying from three and one-half to five minutes was sufficient to effect the complete purification of the great majority of waters. Under these altered conditions, the revolving purifier became of practical utility. Further, it was discovered that when used in the revolving purifier, spongy iron had no special merit; any form of waste iron, such as cast-iron borings or plate punchings, gave equally good chemical results, and were, in fact, preferable to spongy iron, the irregularity of whose form interfered with one of the objects aimed at in the invention, viz : *the automatic and continuous renewal of the active surfaces of the particles of purifying material by causing them to rub one against another.*

As a result of this invention, the spongy iron filters at Antwerp were replaced by a battery of revolving purifiers, three cylinders of a medium size, and contained in a building 31 feet long by 26 feet wide, being found capable of doing twice the work of three spongy iron filters whose united area was 24,000 square feet, and in which the spongy iron alone had cost $40,000.

The theory of what takes place in the revolving purifier and during the subsequent stages of the process is as follows:

The action on the iron in the purifier is one of reduction, the carbonic acid brought by the impure water dissolving a minute portion of the metal and forming a protosalt of iron. On issuing from the cylinder into the open air, the protosalt is gradually converted by the action of atmospheric oxygen into the insoluble form of ferric oxide (Fe^2O^3) with which we are all familiar under the name of iron rust. I need not remind any of my audience who have experience of housekeeping what are the destructive effects of iron rust on linen the fibres of which are in general highly indestructible. The action of the ferric oxide in its nascent state in impure water is analogous to this and burns up, as it were, the organic matter. There is, however, a further action of very great importance, that of coagulation. In its formation, the ferric oxide encases in its flakes the finely divided matters held in suspension by the water, in many cases in a condition of such minute subdivision that they cannot be removed by the most efficient of mechanical filters. These matters are collected together or coagulated and form with the ferric oxide a flocculent precipitate of such a nature that it can readily be removed by rapid mechanical straining. The purification of the water is accomplished as soon as the whole of the protosalt of iron is converted into the insoluble form of ferric oxide, but to complete the process it is necessary, in the case of water intended for supplying a city, to strain out the precipitate. This is done by passing the water through filters composed of sand. Such filters may be as shallow in depth as will insure a homogeneous layer of sand. In the laboratory I have generally found three or four inches of sand ample to retain the iron precipitate, which forms a thin film on the top of the sand, leaving the lower portions of the filter perfectly clean. With large filters it would be impossible to maintain a homogeneous layer of sand as thin as this, and a depth of eighteen inches is desirable.

It will be seen that the revolving purifier is in no sense a filter, and has no power of retaining any impurities in it. On the contrary, mud or other matters in suspension in the water pass freely through the cylinder, their bulk being added to it in a minute degree by the iron dissolved by the water. It is therefore evident that, in order to spare the sand filter, it is advantageous with waters of this description to retain as much as possible of the mud and finely divided matter in a settling trough or reservoir, to the bottom of which they will fall by their own weight when collected together into coarse flakes. Until the spring of 1889, the purified water at Antwerp flowed direct on to the sand filters along a shallow trough. Under those conditions the filters had to be cleaned on the average once a fortnight. Latterly, two subsiding reservoirs have been utilized for receiving the purified water before its filtration, and the sand filters now run six weeks without cleaning. An absolute distinction must be made between sand filters as utilized with the iron process and sand filters used alone in the ordinary way, as at London or Berlin. In the latter case, the sand bed, several feet thick, is looked to to effect, in some degree, the purification of the water. With this view the sand has to be frequently cleaned by washing it through its whole depth and exposing it to the air. With the iron process the sand serves only as a support to the film of iron oxide which it strains out of the water at its surface. It is well known how rapidly an ordinary sand filter will become foul through its whole depth; how, if water be forced through such a filter after a certain point of foulness has been reached, the filtered water will be worse than the unfiltered. With the iron process this is not the case. Purification is completed by the time the water reaches the sand. As a proof of this I may mention that sand filters have been at work at Antwerp for more than five years, that they have never been cleaned below the surface, and yet, at the present time, the water issuing from them contains no free ammonia at all, and less than $\frac{1}{10}$ of a part in a million of albuminoid ammonia; the river water containing on the average $\frac{3}{10}$ of a part in a million of each of these forms of ammonia. In the process of purification the aeration of the water as it leaves the revolving purifier plays a very important part. Purification can hardly be said to commence until the oxidizing action of the air begins the conversion of the protosalt into ferric oxide. To aid the natural aeration it is frequently advantageous to resort to artificial means by blowing air through the water. The diagram gives a view of the general arrangement of purifiers at Antwerp, and shows a simple method by which artificial aeration may be accomplished. The first portion of the shallow trough which receives the water issuing from the purifiers is provided with a perforated false bottom through which air from a rotary blower rises in countless bubbles.

Time will not allow of describing the numerous applications of this process on the large scale to waters of very varied compositions, but I may state that the average results obtained are as follows: Firstly, all color is removed from water. Secondly, oxidizable organic matter, as measured by its power of reducing permanganate of potash, is reduced in proportions varying from forty-five to ninety per cent., according as the organic matter is principally of vegetable or of animal origin. Thirdly, free ammonia and nitrous acid are entirely removed. Fourthly, albuminoid ammonia is reduced from sixty to ninety per cent. Lastly, but in the opinion of, I believe, the majority of scientific men of the present day, most important of all, micro-organisms are entirely destroyed or removed by this process. As Resident Engineer and Manager of the Antwerp Waterworks from the date of their construction, I have followed both the spongy iron process and the Anderson's revolving purifier in their stages. Knowing what a remarkable standard of purity we had reached, I asked the Board of Directors of the company to appoint a commission of the most eminent chemists in Belgium to make weekly analyses of the water, both as to its chemical purity and as well as to its freedom from micro-organisms. This was done, and analyses were made weekly during the whole of last year by Professor C. Blas, of Louvain University; Jorissen, of Liege University; Swarts and Van Ermengem, of Ghent University. The last-named is recognized in Europe as a great author on microbes. The examination of the water for microbes was made by Dr. Koch's celebrated gelatine test, which is, no doubt, familiar to most present. Quarterly reports were made by the Commission, giving the results of the weekly analyses. Each of these reports stated that the very impure and dirty water of the river Nethe was transformed by the process of purification into a liquid equal, from a hygienic point of view, to the present and most healthful spring-water. I have here the final report of the Commission, which gives a *résumé* of the weekly analyses of the whole of the year 1889. The authoritive statements it contains are of such great importance that I may be permitted to translate extracts from it:

"The analyses were made every week, thus constituting a sort of permanent inquiry into the chemical and hygienic quality of the water.

"The concordant results of these numerous analyses have once more confirmed the opinion of all those who have studied the Anderson process of purification. This process, as applied at Waelhem, is of remarkable efficiency, the coefficient of purification is very high, and the water pumped into the Antwerp mains is irreproachable in every respect. The Nethe water, even after being deprived by twenty-four hours' settlement of the matter it holds in suspension, is yellow and thick, and opaque when examined through a depth of two feet. It has a flat taste. After a few days a deposit of brownish flakes forms in it. It shows an average of eighty milligrams of oxidizable organic matter to the litre, of 0.3 milligram of free ammonia, the same of albuminoid ammonia, and marked traces of nitrates.

"After purification, the water becomes limpid and brilliant in appearance. Its taste is fresh and agreeable; when seen through a depth of two feet it is transparent and of a pale green tint. After being kept for several months exposed to the light in bottles stopped with cotton-wool, it remains perfectly limpid. This water contains, on an average, forty milligrams to the litre of oxidizable organic matter. The water never contains more than $\frac{1}{100}$ of a milligram of free ammonia or one-tenth of a milligram of albuminoid ammonia in a litre. It is absolutely free from nitrous acid. The results of the bacteriological examination corroborate those of the chemical analysis. The purifying action of the Anderson process is here most manifest, as is shown by the almost total elimination of all micro-organisms. The water of the Nethe contains a great number of microbes. It may be estimated at an average of 50,000 colonies per cubic centimetre. After purification, water taken from the taps in the city, and which has circulated through a great length of mains, contains an average of seventy-five colonies only. This number of germs is, indeed, small when compared to the number of micro-organisms which pass through filters reputed as the most perfect. But still fewer germs are found when the water is taken immediately on leaving the sand filters at the pumping station. Under the strictest conditions of experiment, we find that this water may be considered practically sterile. The number of colonies which it supplies varies from two to twenty per cubic centimetre. In no case has the Antwerp water-supply disclosed the presence of bacteria of a suspicious or pathogenic kind, such as those of typhoid fever, for which search has been made with special care. It is, therefore, beyond all doubt that the process employed at the Waelhem Pumping Station offers the most complete guarantee that can be desired, in the present state of science, from the point of view of public health"

This is the result obtained under the ordinary conditions of the supply of a large city, and after the process has been continuously at work for five years. I think it may fairly be claimed for the Anderson process of purification that it has proved the possibility of overcoming and counteracting, in a practical and economical manner, the great objections which generally exist to drawing the water supply of cities from the most convenient and abundant source—that furnished by the rivers on whose banks the cities have grown up.

The revolving purifier is made in various sizes designated by the diameter of the inlet and outlet pipes These range from the one-inch apparatus, capable of treating 5,000 gallons, to the fourteen-inch apparatus, which purifies 1,500,000 gallons per twenty-four hours. The power required for rotating the cylinder is very small, ranging from 690 foot-pounds per minute for the smallest purifiers to 28,500 foot-pounds for the largest. The quantity of metalic iron used up in the process varies with the nature of the water under treatment, and with the form of iron used. At Dordrecht, in Holland, where a fourteen-inch apparatus has been in use since 1886, the consumption of iron is at the rate of fifteen pounds per 1,000,000 gallons, purified, "burrs" from punching machines being the form of iron used. At Antwerp cast-iron borings are mostly used, being readily obtainable. Owing to the nature of the Nethe water more iron is dissolved, and there is a considerable waste due to the breaking up of the friable particles of the metal in this form—the total loss being about six times that of Dordrecht. Cast-iron borings are, however, considerably cheaper than plate punchings.

When sand filters already exist, as is the case with the great majority of the European cities or towns, where the water-supply is drawn from a river, the capital outlay involved in applying the revolving purifier process is, approximately, $5,000 per 1,000,000 gallons required per day. When no sand filters exist, the further outlay for these varies considerably with local conditions, and with the size of the lant required. In cases where no settling basins are provided to catch the precipitate formed by the iron oxide, shallow filter beds are required of sufficient area to limit the speed of filtration to 100 gallons per square foot of sand surface per twenty-four hours. If the heaviest portions of the precipitate be arrested in settling tanks, the speed of filtration may be increased up to 200 gallons per square foot, or more with some classes of water, so that the cost of sand filters will be reduced in a more or less regular ratio to the extent of settling basins provided. For works whose output is small, say 3,000,000 or 5,000,000 gallons per day, the cost of sand filters, either with or without settling basins, may be estimated at $15,000 per 1,000,000 gallons of daily consumption. The whole capital outlay, therefore, for applying the revolving purifier process to small water-works, would be, approximately, $20,000 per 1,000 000 gallons of daily consumption. For larger quantities of water the cost per 1,000,000 gallons would, of course, be reduced.

The principal item of expense in working the revolving purifier process, is the periodical removal of the film of iron oxide from the surface of the sand beds The cost of this may vary fifty per cent. or more, according to the provision made for arresting the precipitate by settlement in an open channel, or in a settling reservoir, before the purified water reaches the sand filters. It also varies somewhat with the nature of the water treated, the precipitate being of a finer nature in some cases than in others. At Dordrecht, in Holland, where the river water is charged with very finely divided clay, the precipitate forms with great readiness into coarse flakes, easily retained in an open trough provided with baffle boards placed six feet apart. There is no settling reservoir in this case, but the sand beds require cleaning once in three months only, the total working cost being slightly under $2 per 1,000,000 gallons, the maximum output of the works being 1,500,000 gallons per diem. At Antwerp, previous to the use of settling reservoirs before filtration, the cost, including supervision, was $4 per 1,000,000, calculations being based on an output of 2,000,000 daily. Of this sum $1 was for supervision, an item which would not be increased were the output ten times as great. The recent introduction of settling reservoirs has more than doubled the life of the filtering beds, and expenses are being brought down proportionately. It may be safely estimated that for quantities of 5,000,000 gallons per day and over, working expenses will in no case exceed $2 per 1 000,000 gallons.

Various methods are adopted for providing the small power required for the rotation of the apparatus. At Antwerp, motive-power is given by a steam-engine bolted to the wall of the purifier-house, and driving the five purifiers through a counter-shafting carried on wall brackets. At Dordrecht, where there is a single purifier capable of treating 1,500,000 gallons per day, the water issuing from the cylinder actuates a reaction-wheel, which in its turn rotates the apparatus and at the same time drives a Root's air-blower.

Time allows me to give but a general description of this valuable process; more detailed information may be found by those interested both in the practical and scientific aspects which it presents, in the pamphlet published by me in 1888, and in the circular issued by the present holders of Mr. Anderson's patents, copies of which I have had the honor of presenting to your library.

INDEX.

A. PAGE

Appointments by the Governor 20

B.

Bahnson, Dr. H. T.—Address of at Oxford 23
" " " Elected President 23
Baker, Dr. Julian M., elected to membership 23
Battle, Dr. H. B.—Analyses of water from La Grange 34

C.

Cape Fear river quarantine 22
Carbolic acid in disinfection 101
Cerebro-spinal meningitis 33
" " at La Grange 33
Chloride of lime in disinfection 100
Committees—Standing 2
Colonization of refugees from yellow fever districts 21
Consumption 42
  Comparative mortality between whites and negroes from 42
  Effect of emancipation on prevalence of 42
  Nature of, in the two races 42
  The communicability of 43
  The Koch treatment of 43
  The prevalence of, influenced by the influx of consumptives 42
Contagious diseases—The minor 40
Counties having boards of health—List of 3
" " voluntary reporters—List of 4

D.

Death rate not increased by La Grippe 32
" " of towns for 1889 75
" " of towns for 1890 77
Deaths—Causes of, for 1889 79
  Causes of, for 1890 80
  The relation of diseases to 82
Diphtheria—The prevalence of 37
Diseases—Table showing comparative prevalence of, during the years 1889 and 1890 73
Disinfection—By Prof. F. P. Venable 97
  Carbolic acid in 101
  Chloride of lime in 100
  Definition of 97
  Hot air and steam in 104
  Mercuric chloride in 100
  Reasons for the unsatisfactory condition of the practice of 99
  Sulphur in 102
Domestic animals—The diseases of 44
  No provision by the State for the prevention of 47
Dysentery—Prevalence of 38

E.

Epidemics—Absence of in the State 27
  Of influenza: La Grippe 27
  The management of 9
  Authority to put quarantine in force vested in State Boards of Health 10

Epidemics— PAGE.
Certificates of health ... 11
Holt quarantine and disinfection system indorsed ... 12
Inspectors at quarantine stations, qualifications of ... 10
" " " powers of ... 10
Passage of closed cars through infected localities ... 11
Passengers and freights ... 9
Quarantines, local ... 10
" rules and regulations ... 10
" station accommodations ... 10
Railroad agents and conductors, duties of ... 11
Refuge stations ... 10
Suspicious cases, precautions in ... 11

F.

Fowls—Tuberculous ... 48

G.

Glanders—Chronic form of ... 45
In Wilmington and New Berne ... 44
Prevention of ... 45
Relation of to the public health ... 46
Symptoms of ... 44
Treatment of ... 45

H.

Hadley, Dr. J. M.—Report of on cerebro-spinal meningitis in La Grange ... 33
Hodges, Dr. J. A.—Elected to membership ... 23
" " " Invited to address the Teacher's Assembly ... 23
" " " On La Grippe ... 31
" " " On the care of the insane of our State outside of the asylums ... 105
Hog Cholera ... 47
Hogs fed on offal from slaughter houses ... 53
Holt quarantine and disinfecting system indorsed ... 12
Holt quarantine and disinfecting system, inspection and description of ... 60

I.

Influenza, (see La Grippe).
" in dogs ... 32
Insane of our State, outside of the asylums, the care of ... 105

J.

Jails, mortuary statistics of ... 93

L.

La Grippe—counties in the State first affected by ... 21
Death-rate not increased by ... 32
History of ... 27
Hodges, Dr. J. A., on ... 31
Mild type of ... 31
Symptoms for ... 31
Leprosy in the United States, report of committee on ... 129
Distribution of throughout the world ... 132
Instructions from the Sup. Surg. Gen'l to the medical officers of the H. M. Service in regard to ... 136
Policy to be pursued to suppress ... 134
Protective and non-protective policy in ... 130
Report of minority on ... 137
Cause of the decrease of in Norway ... 140

PAGE.

- Leprosy in the United States—
  - Disadvantage of too vigorous measures 138
  - History of in the North-wetern States 142
  - Recommendations regarding 143
  - "What steps should the United States Government take to prevent the introduction of?" 145
- Lewis, Dr. R. H.—Report on water-supply of Western N. C. Insane Asylum 95
- Ludlow, J. L., C. E.—Report on water-supply of Western N. C. Insane Asylum 95

M.

- Malarial fevers—prevalence of 39
- " " pernicious 40
- Meat—more careful inspection of 48
- Meeting in Raleigh, 1889 20
- " " Elizabeth City, 1889 20
  - Cape Fear river quarantine 22
  - Colonization of refugees from yellow fever towns 21
  - Election of members 22
  - " " President 23
  - Inspection of Western Insane Asylum 23
  - Members prevented from coming to 21
  - Railroad co-operation necessary in quarantine 22
  - Report of the Secretary 21
  - Result of verbal reports from counties 22
  - Station of observation on west side of Cape Fear river 21
  - Yellow fever in Florida, danger of a recurrence of 21
- Meeting in Oxford 23
- Members of the Board, list of 2
- Mercuric chloride in disinfection 100
- Mortality from consumption. comparative beteen whites and colored 42
- Mortuary statistics of jails and poor-houses 93
- " " of towns for 1889 75
- " " of towns for 1890 77
- " " unsatisfactory records of 88

O.

- Oxford meeting 23

P.

- Parasites—Transmission of, by use of flesh as food 49
- Passengers and freights in time of epidemics 10
- Pestilential diseases—Notification of 68
- Pneumonia—Prevalence of 32
- Public buildings—Comparative condition of 84
  - Table showing comparative condition of 86
- Poor-houses—Mortuary statistics of 93

Q.

- Quarantine—Cape Fear river 59
  - Conference at Montgomery, Ala.; call for a 7
  - " " States participating in 7
  - " " list of delegates to 7
  - Holt system of, inspection and description of 60
  - Local 10
  - Rules and regulations 10
  - Station accommodation 10
  - Stations, powers of inspectors at 10
  - " qualification of inspectors at 10

R.

PAGE.
Railroad agents and conductors—Duties of in time of epidemics 11
“ co-operation necessary in quarantine 22
“ trains passing through infected localities 11
Refuge stations 10

S.

Sanitary Association organized 17
“ Convention—Call for a 17
Scarlet fever—Prevalence of 38
Slaughter houses—Inspection of 53
Offal from, fed to hogs 53
Of Mansfield, report on, by Dr. R. Harvey Reed 54
The lack of cleanliness in 53
Small-pox 66
Superintendents of health, list of 3
Sulphur in disinfection 102
Swine plague 47
Communicability of to man 47
Synopsis of work done by the N. C. Board of Health during two years ending December, 1890 7

T.

Treasurer's report 69
Tuberculous fowls 48
Typhoid fever—Prevalence of 40

V.

Vaccination should be a prerequisite for entrance into public schools 65
The neglect of 64
The principles of should be taught in the public schools 64
Vaccine—Supply of 65
Venable, Prof. F. P.—Disinfection 97
“ “ “ Sanitary analysis of water 26, 118
Vital statistics 66
Voluntary reporters, list of 4

W.

Water from La Grange, analyses of 34
Water, purification of, by means of metallic iron 151
“ the sanitary analysis of 118
Western Insane Asylum, report of committee to investigate water-supply of 95
Western Insane Asylum, tour of inspection to the 23

Y.

Yellow fever—danger of spread of from one case 12
disinfection of dwellings after 13
disinfection of personal baggage 13
In Florida, danger of the recurrence of 21
Isolation in, benefits from 13
“ “ guards necessary to enforce 13
“ “ problems in enforcement of 12
“ “ the golden rule 12
Inter-State notification in 15
Railroad quarantine in, rules for 14
Steps for the prevention of 7
“ to be taken on the occurrence of 12

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